UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 6 1984

PRC

Docket Nos.: 50-445
and 50-446

MEMORANDUM FOR: Chairman Palladino
Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal
Commissioner Zech

FROM: Darrell G. Eisenhut, Director
Division of Licensing

SUBJECT: BOARD NOTIFICATION - SPECIAL REVIEW TEAM REPORT
(BOARD NOTIFICATION 84-132)

The enclosed report is being sent to the Commission because the staff has judged that this report may be of special interest to the Commission. The Board is being informed of this report by copy of this memorandum.

Enclosed is a letter to Mr. M. D. Spence, President, Texas Utilities Generating Company, transmitting the Special Review Team Report that resulted from the special review conducted by the NRC during the period of April 3-13, 1984 at the Comanche Peak site. The enclosed letter and report is being transmitted for your information and use. The parties to the proceeding are being informed by copy of this memorandum.

Frank J. Miraglia
for Darrell G. Eisenhut, Director
Division of Licensing

Enclosure: As stated

cc: SECY (2)
OPE
OGC
EDO
ACRS (10)
Parties to the Proceeding
P. Bloch, ASLB
W. Jordan, ASLB
W. McCollom, ASLB

N005
1/1

DISTRIBUTION LIST FOR BOARD NOTIFICATION

Comanche Peak Units 1&2
Docket Nos. 50-445/446

Peter B. Bloch, Esq.
Mr. John T. Collins
Mr. James E. Cummins
Mrs. Juanita Ellis
Billie Pirner Garde
Ellen Ginsberg, Esq.

Renea Hicks, Esq.
Dr. W. Reed Johnson
Dr. Walter H. Jordan
Dr. Kenneth A. McCollom
Thomas S. Moore, Esq.
Nicholas S. Reynolds, Esq.

Alan S. Rosenthal, Esq.
Mr. Lanny Alan Sinkin
Mr. Michael D. Spence
Robert A. Wooldridge, Esq.

Atomic Safety and Licensing Board Panel
Atomic Safety and Licensing Appeal Panel
Docketing and Service Section
Document Management Branch

Mr. Homer C. Schmidt
Mr. H. R. Rock
Mr. A. T. Parker
William A. Burchette, Esq.
Mr. David R. Pigott, Esq.
Mrs. Nancy H. Williams

ACRS Members

Dr. Robert C. Axtmann
Mr. Myer Bender
Dr. Max W. Carbon
Mr. Jesse C. Ebersole
Mr. Harold Etherington
Dr. William Kerr
Dr. Harold W. Lewis
Dr. J. Carson Mark
Mr. William M. Mathis
Dr. Dade W. Moeller
Dr. David Okrent
Dr. Milton S. Plesset
Mr. Jeremiah J. Ray
Dr. Paul C. Shewmon
Dr. Chester P. Siess
Mr. David A. Ward

COMANCHE PEAK

SPECIAL REVIEW TEAM REPORT

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

NRR in coordination with the Director of IE and the Region II & IV Administrators formed a team to perform a limited unannounced review of Comanche Peak. The purpose of the review was of 1) evaluate the current implementation of the applicant's management control of the construction, inspection and test programs, 2) provide an indepth understanding and background information to the NRC new management team established by the Executive Director for Operations memorandum of March 12, 1984, and 3) obtain information necessary to establish a management plan for resolution of all outstanding licensing actions.

The team consisted of eight reviewers, a team leader and team manager. The reviewers and team leader were selected from the Region II staff. The manager was the NRR Comanche Peak Project Director. The team was assembled in Region II headquarters where it was briefed by NRR, IE and ELD.

The team conducted its review from April 3 to April 13, 1984. The review consisted of an audit of significant elements and processes of the applicant's management control in construction, inspections and testing of systems important to safety. These included:

1. Component and material receipt inspection and control.
2. Structure, systems, and component fabrication and installation.
3. Structure, system, and component acceptance, and preoperational testing.
4. Quality assurance and control documentation and procedures to effect items 1 through item 3 above.

The portions of the system evaluated included piping, pipe and component supports, instrumentation and control, electrical cable separation and cable tray supports, component qualifications, and allegations relating to these areas.

The reviews also included briefings from the Applicants' management and interviews with QA/QC, Document Control, and craft personnel. The total effort was conducted with little or no advance notice of areas, personnel or documentation to be reviewed.

Each member of this team was chosen because he had both many years experience in the discipline he was reviewing, and he had performed evaluations at a wide range of nuclear facilities. The team spent over 800 hours performing this review. The following is a list of the special review team members, their positions, and field of expertise:

Paul Bemis, Section Chief, Management Organization, Qualification and Training
Paul Fredrickson, Project Engineer, Quality Assurance/Quality Control,
Bill Orders, Senior Resident, Preoperation and Startup
Kim VanDoorn, Senior Resident, HVAC and QC inspector interviews

Al Ruff, Reactor Inspector, Electrical
Louie Jackson, Reactor Inspector, Quality Assurance/Quality Control
Winston Liu, Reactor Inspector, Design Activities/Control
Ed Girard, Reactor Inspector, Welding and Metallurgy
Joseph Lenahan, Reactor Inspector, Civil and Structures

The teams findings indicated that the applicants management control over the construction, inspection, and testing programs is generally effective and is receiving proper management attention. The findings identified three potential enforcement actions (See Sections B&E); two areas of weakness requiring Applicants management attention; (See Section B) and seven areas where Applicants activities exceeded normal and accepted practice (See Sections A, B & E). The team also found improvements in the relationship between the current QA/QC management and inspectors which in the past has caused communication problems (See Section I). The team believes that the results of this limited review reveal the plant is being built in a safe manner.

The findings and conclusions of this report of the teams review should not be construed as resolving any of the issues identified by the ASLB hearings, allegations, or staff concerns of the design adequacy of the plant.

II. Background

On March 17, 1984, the EDO directed NRR to manage all NRC actions leading to licensing decisions for Comanche Peak and Waterford. The purpose is to assure the overall coordination and integration of the outstanding regulatory actions and achieving their resolution prior to a licensing decision. This effort is to encompass all licensing, hearing, inspection and allegations issues.

Soon thereafter, the newly established Comanche Peak project team found that there was a need to 1) obtain current information relative to the management control of the construction, inspection and test programs and 2) obtain information necessary to establish a management plan for resolution of all outstanding licensing actions. To help achieve this objective expeditiously and objectively it was decided that an unannounced review of Comanche Peak plant was necessary. As a consequence, NRR in coordination with OIE and the Region II and IV Administrators formed a review team. Because of resource limitations in Region IV, the team was staffed with Region II personnel. The team was assembled in Region II Headquarters on April 2, 1984. The team was briefed on significant issues raised as a consequence of the licensing review, the hearing contentions and the allegations. The team leader and the reviewers were not provided with the names of the allegers in order to assure their confidentiality. The team conducted their review from April 3 to April 13, 1984.

III. Review Approach

The teams' review approach was to first obtain an understanding of Comanche Peak management and management control systems. This was accomplished by briefing from the Applicants management.

With this understanding, the team reviewers commenced their efforts. These included examination of appropriate documentation, formal and informal interviews of plant personnel, and specific technical allegations related to their areas. The allegations were not reviewed separately but were subsumed in the total review in order to provide further assurance of alleger confidentiality and not compromise any on-going or future investigations.

In addition to the review of the Quality Assurance program, from a programmatic point of view, each of the reviewers examined the implementation of the QA/QC program in their individual areas of expertise in an attempt to identify any breakdowns that could exist in a narrow area.

IV Review Findings

The team conducted its review of the following areas:

A. - Management Organization
B. - Quality Assurance/Quality Control
C. - Equipment Turnover and Preoperational Testing
D. - Electrical
E. - Design Activities/Control
F. - Installation of Safety Related Fluid Systems
G. - Civil Construction
H. - Heating, Ventilation, and Air Conditioning Systems
I. - Formal Interviews with QA/QC Personnel

The review, findings and conclusions in each of these areas are provided below:

A. Management Organization

The construction and operations organization were reviewed to insure a working relationship between the organizations as well as functional relationships within each organization. The qualifications of the individuals in positions of authority were reviewed against regulatory standards and the applicant's commitments. In addition to qualifications, a review was made of the interface between all levels of the command chain.

The limited review revealed that in all areas, individual qualifications appear to meet requirements, the interface between construction and operations appears to be functioning in a workable manner and interface between all levels of the management chain appears to be functioning in an acceptable manner. There appears to have been a communication problem in the onsite QA/QC chain in the past, but according to interviews conducted during this review the problem has and is being corrected.

This review found the management and craft at Comanche Peak appear to be competent and management to possess a positive attitude which is a strength at this project. Management exhibited a sufficient level of consciousness for both safety and employee concerns. These management attitudes were confirmed by the attitudes they manifested in their employees and the attention to detail in the required quality of work.

B. Quality Assurance/Quality Control

The following areas were reviewed primarily from a programmatic point of view: nonconformance control; training, audits; records (maintainability and retrievability); document control; receipt, storage and handling of materials; and procurement.

Within the areas reviewed, there were several findings identified. The following is a brief description of each according to category:

1. Potential Enforcement Issues.

   a) ASME record packages were not being maintained in a fire proof container.

   b) At least two vendor audits had not been performed within the required time period.

2. Weaknesses

   a) Certain drawing packages issued to the field contained non-applicable DCAs and/or CMCs, which had been deleted by engineering.

   b) Many non-ASME Section 3 drawings contained a large number of DCA's and CMC's (over 300 in some cases) outstanding without being incorporated by revision.

3. Strengths

   a) The QA/QC training program is extensive and comprehensive.

   b) The use of a recently established computer system drawing control instead of stamped drawings referencing design changes.

   c) The vendor witnessing program is extensive in its audits and source inspection of purchased materials

d) The ability to expeditiously locate and retrieve records, without prior notice, from permanent records vault.

Overall the current QA/QC program appears to be functioning satisfactorily. The recent management changes seems to have corrected past communication problems.

C. Equipment Turnover and Preoperational Testing

The processes of turnover of safety related equipment from construction to startup as well as pre-requisite and pre-operational tests of the equipment were reviewed to determine adequacy of: methodology employed in turnover of equipment to startup, return equipment to construction for rework, and ultimate release of equipment to operations; technical and administrative controls over preoperational testing; and preoperational test procedures, both technical content and administrative control.

This review found the majority of the tests to be performed are retests or reperform's and could be conducted in parallel with the remaining initial test. The performance of the remaining test should not impact an October 1984, fuel load date. In addition, the turnover methodology and control of the preoperational test program appears adequate.

D. Electrical

The assessment in this area was to determine acceptability of the safety related electrical equipment installed and inspected in accordance with NRC requirement and applicant commitments. A review was made of the overall program to include: drawings, procedures, quality control inspections, and records.

The review found that the safety-related electrical equipment is being installed and inspected as required.

E. Design Activities/Control

This review focused on the following areas: requirements of IEB 79-02; IEB 79-14: Alternate Analysis for small bore piping system, rigorous analysis for safety related piping systems; review of design calculations for pipe supports; review of stress analysis for piping systems; field inspection and verification; and the iterative design process.

A potential enforcement action was identified in that certain pipe supports which had been inspected and accepted were not installed in accordance with design drawings. There was also a strength identified in that the applicant was found to have used conservative considerations in many areas of design and analysis for the safety related piping systems and pipe supports.

The review concluded that the design program and its implementation appear to meet or exceed requirements, except as noted above.

F. Installation of Safety Related Fluid Systems

The review of this area was directed towards assessing the adequacy of installation of safety related fluid systems used for safe operation and shutdown of the plant. This review contained: first hand observation of systems by the reviewer; examining control of welding materials; examination of piping supports, welds and records.

The reviewers concluded that the applicants program appears to assure compliance with requirements, commitments and good engineering practice.

G. Civil Construction Activities

Examination of site civil design activities, including design change process, procedures and QA records of completed work activities (such as the SSI dam, cable tray supports and whip and moment restraints), and procedures and work activities for ongoing work (such as application of protective coating) was performed.

The limited review found that the applicant was meeting requirements in these areas. Two areas of note: (1) protective coatings and (2) thermo lag, appear to be progressing in a manner such that they will not impact an October fuel load.

H. HVAC

This effort followed up on previously identified discrepancies at Comanche peak and other sites which used the HVAC vendor. In all areas reviewed where discrepancies had been identified the applicant appears to have addressed the problem either through rework or reanalysis. The HVAC system appears to be adequate.

I. Formal Interviews with QA/QC Personnel

Formal interviews of five (5) management/supervisory personnel and twenty-eight (28) inspectors were conducted to assist the team in assessing quality of work and management support of quality. It was felt discussions with inspection personnel would give a conservative insight into the quality of site construction.

The major thrust of the interviews was to determine if; (1) the personnel had any plant safety or quality concerns; (2) intimidation was experienced; (3) training was adequate; (4) inspectors could freely talk to NRC; (5) management supported problem identification; (6) was there feedback on identified problem evaluation.

With the exception of two inspectors who were "unsure" due to lack of knowledge, all personnel interviewed felt the plant was being built in a safety and quality manner. There were some concerns raised which will be forwarded to the Comanch Peak Project Director for evaluation; in some cases, Region IV was already aware of the concerns and performing followup. The major problem in the past appears to have been communication between inspectors and their supervision, but it is apparent that for the past couple of months and presently, this problem is being addressed properly.

In addition to formal interviews, each reviewer performed numerous informal interviews to determine problem areas. The overall conclusion from all interviews was that the Comanche Peak Project is being built safely and with quality.

V. Conclusion

The purpose of the special team review has been met in that (1) an assessment of the applicant's current management control of the construction, inspection and test programs has been made; (2) an in depth understanding has been achieved and (3) information has been obtained to establish a management plan for the resolution of all outstanding licensing actions.

With respect to the assessment of the applicant's management control of the construction, inspection and testing programs, the special review team has determined that based on the number and significance of the strengths vs weaknesses identified in this review, that the applicant's programs are being sufficiently controlled to allow continued plant construction while the NRC completes its review and inspection of the facility.

Further, the review provided a sufficient understanding of these programs and their strength and weakness to assist in the development of the "Comanche Peak Plan for the Completion of Outstanding Regulatory Actions." This plan was approved for implementation on June 5, 1984.

A. Management Organization

1. Entrance Meeting

The afternoon of April 3 the special review team arrived onsite unannounced. The team spent the afternoon of April 3 and the morning of April 4th meeting with the applicant's Senior Corporate Management, Site Management, Site QA Management, and Document Control Supervision being briefed on the organization, functions, and location of areas under their control.

2. Management Organization

The nuclear portion of Texas Utilities Generating Company is organized in the following manner for its senior management:

a) The highest level executive is the President of the company. The President has recently turned over all possible non-nuclear duties to his Executive Vice President-Plant Operations. The President's primary responsibility is to complete the Comanche Peak Steam Electric Station as safely and expeditiously as possible.

b) Reporting directly to the President are the Executive Vice President Engineering and Construction and the Vice President Operations. Even though there are fossil plants presently being built in the system and the licensing organization reports to the Executive V.P. Engineering and Construction he spends between 60-80% of his time at the Comanche Peak Site. He has also delegated his non-nuclear responsibilities in an effort to focus on the nuclear station completion. The Vice President-Operations (V.P. OPS.) spends approximately 80% of his available time on site directly observing the operations group preparation to take over the plant upon construction completion. He is also an active participant in construction and startup meetings and the decision making process. A few months ago the V.P.OPS. was moved from his normal reporting path to Executive V.P.-Plant operations, directly reporting to the President.

c) Reporting to the Executive Vice President Engineering and construction is the Vice President Engineering and Construction (V.P.E.&C.). The V.P.E&C. has been located on the Comanche Peak site since 1977 and during the same year he assumed the additional title of Project General Manager for Comanche Peak. In January 1984 he delegated his non-nuclear responsibilities in order to devote his full attention to Comanche Peak completion.

d) The Assistant Project General Manager (APGM) reports to both the V.P.E&C and the V.P.OPS. He reports to the V.P.E&C. in the areas of construction and onsite engineering and to the V.P.OPS for startup (S/U). This position is where the common tie between construction and operations is most decisive. The APGM has been on site since 1977.

e) In addition to the APGM, the V.P.OPS has reporting to him: The manager of Nuclear Operations, who is located at the site, and the Manager of Quality Assurance who is located in the corporate office but has a Quality Assurance/Quality Control Manager on site who is responsible for all QA/QC on site.

The current positive management attitude is a strength exhibited at Comanche Peak from both the operations and the engineering and construction sides of the company. This positive attitude appears to manifests itself in the attitudes of the workers, the training, and in its consciousness for quality.

One additional strength was noted in that the applicant is using operations' maintenance procedures to perform periodic maintenance on equipment in the plant, and the applicant is using full Anti-C dressout and respirators for the craft (for training) to perform maintenance activities so when the equipment becomes contaminated the workers will be use to the confining clothes and equipment. This practice should significantly reduce exposure and therefore dose received by these individuals after the plant is operational.

3. Project Management Meeting

Every Saturday morning a project management meeting is held, wherein work activities, progress, startup and test problems, and QA/QC coverage is discussed. This meeting is attended by Senior Corporate Management; including the President of Texas Utilities Generating Company, and the Senior management from construction and operations; it is also attended by the site management of construction and startup.

Several members of the review team attended this meeting on April 7, 1984. The meeting appeared to be well managed, with problem areas being openly discussed (even though senior company management and NRC were in attendance, the dialogue between individual managers and supervisors was not toned down). An example of an area of concern which was discussed was the completion of the application of protective coatings in the containment. It was the general consensus that additional manpower was required to complete the work effort. An additional 100 people were authorized with the expectation they would be available within one week.

During this meeting it was decided to change the concept that was presently being used for plant completion. The applicant had been using a Building completion methodology, but after consultation and reviews by an acknowledged industry expert is was decided to prioritize systems completion, with buildings to follow, or run in parallel where possible.

The highest level of the Company's management in attendance at this meeting allows for immediate decisions to be made for the next weeks priorities for plant completion. This method of holding project meetings appears to have kept the applicant in position to meet their projected fuel load date.

B. Quality Assurance/Quality Control

1. Nonconformance Control

References:	CP-QAP-16.1, R20,	Control of Nonconforming Items
	CP-QP-16.0, R13,	Nonconformances
	CP-QP-16.1, R5,	Significant Construction Deficiencies
	CP-QP-17.0, R3,	Corrective Action
	CP-QP-15.7, R2,	Tracking of Audit Reports/Corrective Action Reports

a. General

This portion of the review was performed to verify that:

- nonconformances are being identified
- items were considered for reportability to NRC
- corrective action prevented recurrence
- the licensee has an adequate trending program

b. Review Effort

The reviewer selected NCRs from various safety related systems to verify the following:

- logged numerically for control
- maintained even when later cancelled
- considered for reportability to NRC
- corrective action initiated which prevented recurrence
- considered in a trending program

The following NCRs were reviewed:

C-84-01030	M-83-01162, R2
M-84-00965	M-11678N
M-82-01528, R2	M-11660N
M-83-01454, R1	M-11675N
M-04729, R1	M-11687N
M-05689, R0	E-84-01031
M-06244, R1	M-01695N
M-09765	M-01692
M-09766	M-09812S, R1

The responsibility for closing NCR M-09812 S, R1, has been transferred to TUGCO startup because these Westinghouse valves are required to be disassembled during system flushing. The valves are to be reassembled under a startup work authorization (SWA). Valve stroke time testing of these valves will be verified under the SWA. The relief valves listed on NCRs M-09765 and M-09766 were required to be reset because the vendor had not been furnished the correct back-pressure information to set the valves.

c. Conclusion

The limited review found that nonconformances were being written when identified, the items were considered for reportability to NRC, that corrective action to prevent recurrence was being initiated, and items were being trended.

2. Quality Assurance/Quality Control Training

References:	CP-QAP-2.1, R10,	Personnel Training and Qualification
	QI-QAP-2.1-1, R6,	Nondestructive Examination Personnel Certification
	QI-QAP-2.1-5, R5,	Training and Certification of Mechanical Inspection Personnel

a. General

The purpose of this part of the review was to verify that the licensee has:

- a formal training program
- conducted required training to qualify personnel
- requirements for on-the-job training
- objective evidence of personnel qualifications
- evaluated the candidate's education, experience, and training prior to certification
- reevaluated personnel on a periodic basis
- records of personnel qualifications

b. Review Effort

A review was made of the documents listed above, and the reviewer held discussions with responsible corporate and site personnel to verify that procedures are consistent with regulatory requirements. A review was made of General Examination Tests, RT-II-G-A, UT-II-G-B, PT-II-G-B, and MT-II-G-F; also Practical Examinations MT-II-P-04 and PT-II-P-07. These examinations confirmed the tests to meet the requirements of ASNT-TC-1A, Recommended Practice. The records of seven QC inspectors were reviewed. The records contained objective evidence of QC inspectors qualifications by general and practical examination, on-the-job training, classroom, specialized training, education, and work experience records were available to confirm QC inspectors meet the requirements of ASNT-TC-1A and ANSI N45.2.6-1978. Confirmation of annual documented evaluations of qualifications of inspectors was verified.

c. Conclusion

The training requirements for QA/QC personnel listed in the procedures appear to be complete. When personnel were questioned as to the training they were actually receiving, they confirmed the depth of training which the procedures required.

3. Audits

References:	QI-QAP-2.1-4,	Auditors Certification
	DQI-CS-4.6, R6,	Conduct of Internal, Prime and Subcontractor Audits

a. General

The TUGCO QA audit program is based on FSAR Section 17.1.2 which addresses ANSI N45.2.12, Draft 3, Rev. 0. TUGCO Corporate Office is responsible for audits both internal and external. The audits spanned contractors, engineering, construction and corporate. Audits are listed in five areas, Site Construction/Engineering/Quality Control, Operations/Startup, Vendor, Pre-award Surveys, and Vendor Surveillance. Audits scheduled in the five areas were 107, 158, and 80 during 1982, 1983, and 1984, respectively.

b. Review Effort

A review was made of the licensee's implemented audit program to verify whether it meets the requirements of the accepted QA Program and ANSI N45.2.12 (Draft 3, Revision 0 - 1973) as endorsed by the QA Program. The reviewer also verified the following aspects of the audit program:

- The scope of the audit program has been defined and is consistent with FSAR commitments

- Responsibilities have been assigned in writing for the overall management of the audit program

- Methods have been defined for taking corrective action when deficiencies are identified during audits

- The audited organization is required to respond in writing to audit findings

- Distribution requirements for audit reports and corrective action responses have been defined
- Checklists are required to be used in the performance of audits

The reviewer selected audits TPC 40, 43, 56, 57, 61, 69, 70, and TUG 22 performed during 1982 and 1983 for review. The audits were preplanned to cover specific functions and were comprehensive. The reviewer noted that some audits had not been distributed in accordance with ANSI N45.2.12-1977; however, proper corrective action had been taken by QA audit supervision and was documented by memorandum dated August 16, 1983. Subsequent reports were distributed in a timely manner. Review of the vendor audit program is discussed in paragraph B.7.

The records of four lead auditors and two auditors were reviewed.

The qualifications of auditors and lead auditors were verified to be in accordance with the requirements of ANSI N45.2.23-1978. Confirmation of annual documented evaluations of qualifications of auditors were verified.

c. Conclusion

As a result of this limited review, the reviewer concluded that TUGCO Corporate Management, site QA/QC, and engineering audit activities are acceptable.

4. Records

References:	(a)	CP-QP-18.2, R2,	Implementation of the Permanent Plant Records Management System
	(b)	CP-QP-18.3, R2,	Permanent Plant Records System Organization
	(c)	CP-QP-18.4, R2,	Permanent Plant Records Receipt Control and Storage
	(d)	CP-QP-18.5, R2,	Automatic Records Management System Implementation
	(e)	CP-QP-18.6, R0,	Record Turnover to TUGCO Operations Group
	(f)	CP-QP-18.7, R0,	N-5 and N-3 Code Data Reports
	(g)	CP-QP-18.8, R1,	Records Verification

(h) CP-QAP-11.1, R3, Fabrication and Installation Inspection of Components, Components Supports, and Piping

(i) CP-QAP-16.1, R20, Control of Nonconforming Items

(j) CP-QAP-12.1, R8, Inspection Criteria and Documentation Requirements Prior to System N-5 Certification

(k) CP-QAP-18.1, R2, Processing QA Records

(l) CP-QAP-18.2, R4, QA Review of ASME III Documentation

a. General

The quality assurance records program is based on FSAR Section 1A (B) which addresses ANSI N45.2.9 (Draft 1, Rev. 0, 1973) for the design and construction of Comanche Peak. The site records program is managed under the control of the Site QA Manager. The Permanent Plant Records Vault (PPRV) houses most of the design and construction records for completed work and have had final review performed. Completed records are being turned over to the control of the operations records control system on a regular basis. Temporary storage of records is also ongoing at several working locations at the site utilizing one-hour fireproof cabinets. Records, where possible, are filed, by system and component. The PPRV uses smoke detectors tied into the site fire station for records fire protection; a water hose adjacent to the main PPRV door provides fire extinguishing capability, as do portable fire extinguishers in the area.

A computer is used to aid record retrievability, but is not essential, as records are maintained in hard copy. Records flow to the PPRV through both a regular site construction/QC path and an ASME path.

b. Review Effort

A review was made of various procedures to verify that provisions had been made to maintain various types of quality records, and that responsibilities had been assigned to carry out the records storage requirements. Records storage procedures were also reviewed to ensure that they described the storage facilities, the filing systems used, methods of receipt, and handling and disposal of the records. The Brown and Root (B&R) program for flow of ASME

Section III records to the PPRV was reviewed. The reviewer also verified retrievability of records from the PPRV.

To verify general record retrievability, the reviewer selected several general construction and inspection packages such as weld data, concrete placements, equipment packages, and equipment travelers. All records were retrieved in a short period from the PPRV. During the review, other records were retrieved of specific design/construction/inspection activities. No significant difficulties were identified during these real-time challenges to the records retrievability system. The ability to expeditiously locate and retrieve records is identified as a strength. This ability appears to be primarily due to indexing and storage of records by component or material, when possible, instead of by record type.

To review the B&R ASME records flow, the records associated with safety injection isometric SI-2-RB-13-4; Core Spray CS-1-SB-032; Chemical and Volume Control CT-1-SB-14; Component Cooling CC-2-SB-042; Boron Recycle BR-1-SB-05 Spool 1Q3; BR-1-SB-004 Spool 1Q3, BR-1-SB-006, and Main Steam MS-1-SB-050 were reviewed. These records contained the inspector's identification, the type of inspections, the acceptability, verification of review and approval, and were readily retrievable. Heat numbers on materials installed in the field were recorded during a site tour. Certified Materials Test Reports (CMTR) were requested and furnished which verified traceability for those items recorded during the tour. Also CMTRs, for selected subassemblies were verified to meet ASME code requirements. Review of records for the subassemblies listed above confirmed that Design Change Authorizations (DCAs) and Component Modifications (CMCs) were incorporated into the as-built drawings prior to the ASME code stamp being applied to systems. This program of records review, approval and turnover from B&R, the ASME "N" stamp holder, to TUGCO appears to be very thorough, though complex. Records for work performance by B&R are assembled, reviewed, and approved, then submitted to the Authorized Nuclear Inspector (ANI) for review, then submitted to TUGCO for filing. A task force comprised of B&R and TUGCO personnel, then make another review of these records. Any discrepancies noted are then resolved between B&R and TUGCO. These records are then red labeled, and can not be removed from the vault without written approval of QA management; thereby, preventing loss of QA records.

A review was made of the temporary storage of records in the field. Although records are best protected in the PPRV, record storage in adequate fire proof cabinets is allowed based on the record storage equipment qualification in NFPA No. 232-1975, which bases fire protection on exterior fire load calculations. Although the reviewer did not check any fire load calculations justifying the use of one-hour fire cabinets, those cabinets observed appeared to be adequately protected. During this review, the observation was made that several completed ASME moment restraint record packages being maintained in a non-fireproof cabinet in the ASME Safeguards Building QC trailer. This failure to store quality assurance records in a fireproof cabinet is a potential enforcement issue. Prior to conclusion of the review, these records were relocated to fireproof cabinets. Based on the above problem, the reviewer noted some confusion at the site on the control of "documents" as they progress through design/construction/QC and as to when they become "records." This was evident as little distinction appeared to be made for the storage of "documents" or "records" in the field. Working "documents" were provided equal to or better protection than "records" in some instances. Other than the example stated, no other storage problem was identified. Comanche Peak had established, on March 30, 1984, records monitoring teams to review the records flow program. The clarification of the document/records interface for storage control is a weakness and is to be addressed by the monitor teams. This weakness is considered part of the potential enforcement issue addressed above.

The physical construction of the PPRV was reviewed. The construction of the PPRV is satisfactory for protection from exterior fire damage. For inside originated fire damage, the PPRV has a fire detection system but does not have the industry standard water or halon automatic fire suppression system. The system for unattended PPRV fire control was reviewed. With the fire detection alarms annunciating in the close-by fire station, the fire station personnel having ready access to the PPRV and the location of a fire hose reel outside the PPRV door, the fire protection appears adequate. Verification was made that the operations vault, into which all the PPRV records will be transferred, contains an automatic fire suppression system.

c. Conclusion

The records control of the PPRV appears to meet all requirements, with sufficient staff to control the activity. Records flow to the PPRV needs clarification, but appears adequate in implementation. Records personnel appeared knowledgeable as to PPRV operation.

5. Document Control

References: (a) DCP-3, R17, CPSES Document Control

(b) DET-12, R0, DCC/Task Force Interface

a. General

Controlled documents, primarily drawings, specifications, and procedures are maintained and controlled by the site Document Control Center (DCC). The predominance of document control within the sphere of the DCC relates to drawing control and changes to those drawings. The DCC has established satellite document control centers which control and distribute most of the working documents. These satellites provide controlled document copies to crafts and the Unit 1 Task Force Paper Flow Groups (PFG). Controlled documents and changes are provided to the satellites from the DCC. The DCC also provides controlled documents to several "controlled number recipients" directly. The PFG provides controlled documents to craft working in that specific building task force. Revisions to controlled drawings and documents that affect controlled drawings, such as design change authorizations (DCAs) or component modification cards (CMCs) are distributed upon receipt to the satellites and controlled number recipients. For drawings, a computer system keeps track of drawings and the DCAs and CMCs that affect those drawings. When new drawings, drawing revisions, DCAs, or CMCs are generated the computer is updated. When the satellites receive a new drawing revision, CMC or DCA, any controlled drawings checked out to the crafts or under the control of the PFG are updated by the satellite DCC personnel. This maintains current the controlled drawings in use by insuring that drawing packages contain the correct revision with applicable DCAs and CMCs. Drawings checked out to the craft from the PFGs or directly from the satellites are returned at the end of the working day. Prior to checking out drawings from a satellite directly to the craft, a computer run is made to insure that drawing packages contain the appropriate revision and applicable CMCs and DCAs. When craft personnel return drawing packages to the satellite or PFG, a drawing, CMC and DCA check is again performed to verify return of the controlled documents.

b. Review Effort

A review was made of the references listed to verify they met the requirements of the accepted QA Program. The reviewer also verified that administrative controls have been established for the control of drawings and that indices are maintained for drawings, manuals, specifications, and procedures which indicate current revisions.

In order to verify the control of drawings, the reviewer selected several drawings to determine if the current drawing revision with applicable DCAs and CMCs located in the DCC, was also onhand in the control and auxiliary building PFGs. Two drawing discrepancies were noted. Drawings 2323-E1-2011, R8 and 2323-E1-0900, Sheet 1, R6 maintained in the PFG had several DCAs in the package that were missing from the current drawing package computer printout. The verification was performed on April 12, 1984, using a current drawing status. This problem appears to be from engineering eliminating CMCs and DCAs from its data base applicable to particular drawings without informing DCC of the change. Although the computer change keeps satellite issues current, no "trigger" device causes satellite personnel to remove the CMCs and DCAs from the PFG drawing package. A review of the engineering mechanism for updating the data base found the procedure satisfactory and a review of having non-applicable CMCs or DCAs in the drawing package revealed that while possibly confusing, the practice is not a technical problem. As the working controlled drawing packages are expected to be current at all times, this mechanism whereby non-applicable CMCs and DCAs remain in controlled drawing packages is identified as a weakness.

The computer assisted drawing control program was reviewed. Specifically, with the sole reliance on the current computer printout to determine drawing package adequacy, the controls of computer input and changes were reviewed. Access codes have been established so that a limited number of engineering and DCC personnel have access to affect their respective data base. A procedure and training exists to define appropriate computer changes authorized for each group. The system appears to be adequately controlled and use of a computer system versus stamped drawings referencing DCAs and CMCs is identified as a strength.

During this review, a frequent observation from all reviewers was the continued maintenance of a large number of CMCs and DCAs in drawings packages, rather than making a revision to the drawing incorporating the completed changes. Interviews with craft and QC personnel revealed that other than the inconvenience of the sheer volume of a large number of CMCs and DCAs in a package, they had not encountered construction errors due to accumulation of DCAs and CMCs. In that no problem appear to be developing, but the potential to lose control is high when drawings are not revised periodically to keep outstanding drawing changes reasonably low, the maintenance of working drawings with a large number of completed CMCs and DCAs without a drawing revision is identified as a weakness. The applicant does have a program under way which began two years ago to update those drawings identified by operations as needed for safe operation. This program is scheduled for completion by fuel load.

c. Conclusion

The limited review revealed that the current document control system appears to be functioning satisfactorily. All DCC and PFG personnel interviewed were aware of their responsibilities and how their job was performed. The DCC, satellites, and PFGs reviewed appeared to be adequately staffed.

The use of the drawing control computer appears to keep craft personnel up-to-date in an expeditious manner.

6. Receipt, Storage, and Handling of Materials

References:	(a)	CP-CPM 8.1, R1,	Receipt, Storage, and Issuance of Items
	(b)	CI-CPM 8.1, R1,	Color Coding of Piping Materials
	(c)	CI-CPM 8.2, R5,	Control of Spare Parts
	(d)	MCP-10, R7,	Storage and Storage Maintenance of Mechanical and Electrical Equipment
	(e)	ICP-5, R3,	Control of Permanent Plant Instrumentation
	(f)	CP-QAP-8.1, R7,	Receiving Inspection (for ASME items)
	(g)	CP-QP-8.0, R2,	Receiving Inspection

a. General

Warehousing activities are managed under the Project Support Services organization. Safety-related material is stored in several warehouses and also in an outside laydown yard. All material is received at one warehouse and then moved to the appropriate storage location. Shipping damage inspections are conducted by warehouse personnel and receipt inspections are performed by QC inspectors. Environmentally sensitive material is stored in a temperature and humidity controlled storage location. A preventive maintenance program exists to insure that mechanical and electrical equipment is maintained in an operable condition while in storage.

b. Review Effort

A review of the licensee's program for the receipt, storage, and handling of equipment and material with respect to selected elements of the licensee's accepted QA Program was performed. The review was to verify that administrative controls had been established concerning receipt inspection of safety-related materials, preparation and retention of required documentation, control of nonconforming and conditional release items and control of items in storage. Implementation of the program was reviewed by selecting several safety-related items in storage and verifying document and item control to be in accordance with the program.

The reviewer also toured the warehousing locations. Storage discrepancies were not identified. The QC receipt inspection program was also reviewed. QC inspections appeared to be conducted in a satisfactory manner.

c. Conclusion

Based on the limited review of the warehousing and receipt inspection program and implementation, both programs appear adequately managed. Storage locations appear adequately staffed. Warehousing and QC personnel were knowledgeable and professional in their respective areas.

7. Procurement

References:

(a) CP-EP-5.0, R7, Procedure for Field Procurement

(b) DQP-CS-2, R6, Procurement

(c) DQP-CS-4, R9, Procedure to Establish and Apply A System of Pre-Award Evaluations, Audits, and Surveillances

(d) DQI-CS-4.1, R3, Vendor QA Manual Reviews

(e) DQI-CS-4.2, R3, Generating and Maintaining the TUGCO Approved Vendors List

(f) DQI-CS-4.3, R4, Vendor Performance Evaluation System

(g) DQI-CS-4.4, R4, Conduct of Vendor Pre-Award Evaluations

(h) DQI-CS-4.5, R6, Conduct of Vendor Audits

(i) DQP-VC-1, R7, Final Inspection and Release for TUGCO

(j) DQP-VC-2, R7, Witnessing Trip

(k) DQP-VC-3, R3, Initiating Yellow Flag Sheets

(l) DQP-VC-4, R6, Guidelines for Certifying Vendor Compliance Inspection Personnel

(m) CP-QP-5.0, R1, Quality Assurance Review of Site Generated Procurement Documents

a. General

Safety-related purchase requisitions are generated by TUGCO engineering at the site and are converted to purchase orders by the site procurement and subcontracts section. Technical and QA requirements are determined by engineering. A QA review of all safety-related purchase orders is conducted on site to verify QA requirements and use of an approved vendor. Each purchase order requires the vendor to inform TUGCO when a product is ready to ship. TUGCO QA determines whether to perform a pre-shipment inspection at the vendor's location or to waive this inspection. Approximately one-third of all safety-related shipments are source inspected. TUGCO also maintains a vendor audit program to insure that vendors can meet the requirements imposed by the purchase orders. The vendors that are satisfactorily audited are placed on the approved vendors list. TUGCO has also initiated an annual review of supplier performance.

b. Review Effort

A review was made of the licensee's procurement program with respect to selected elements of the accepted QA Program. The review was to verify that administrative controls had been established for the preparation, review, approval and revision of procurement documents. A review of the licensee's procedures to verify that acceptable methods were being used to qualify vendors which provide quality goods or services; that these procedures required the maintenance of records of supplier qualifications and audits; and that responsibilities have been assigned to perform the vendor qualification program was performed. Several purchases orders at the site and at the TUGCO offices in Dallas were reviewed. Purchase orders, based on the limited review, appeared to be handled satisfactorily.

Also reviewed was the source inspection or witnessing program implemented from the TUGCO QA office. The program is quite extensive and appears to be very effective at performing material inspections at the source and identifying potential problems difficult to detect by a receiving inspection alone.

A portion of this program, though, needs clarification. Although, the witnessing procedures describes how to perform the source inspection, criteria is not documented for the decision on what purchase orders are source inspected and which are waived. This is considered a procedure weakness, but not a program weakness. The entire witnessing program is a <u>strength</u>.

Also reviewed was the vendor audit program, which is used to maintain the approved vendors list. The reviewer selected several vendors on the current list and reviewed their most current audits. All audits reviewed were considered satisfactory. Two of the vendor audits, Dresser Industries and Forney Engineering were last audited in 1978. The licensee, through the FSAR, utilizes ANSI N45.2.12, Draft 3, Rev. 0 to develop the audit program, a part of which is the vendor audit program. Paragraph 3.4.2 of this standard requires the performance of annual audits or at least one audit during the lifetime of the activity. NRC Regulatory Guide 1.144, Revision 1, Auditing of Quality Assurance Programs for Nuclear Power Plants, which the licensee has not endorsed, clarifies this annual requirement with respect to vendor audits, in that vendors may be audited triennially providing that annual evaluations continue to show the vendor performing satisfactorily. The TUGCO vendor audit program does not provide for an annual, triennial or any periodic vendor audit schedule. Vendors are reaudited primarily on a usage and performance history basis. This failure to establish measures to audit vendors at least triennially is considered a potential enforcement issue. The inspector found no indication that a failure to audit periodically resulted in maintaining an unsatisfactory vendor on the approved vendors list. Also, although the vendor witnessing program does not review the vendor's QA program, and is not a substitute for a TUGCO audit, the large number of source inspections would mitigate the possible consequences of not performing periodic vendor audits.

c. Conclusion

The procurement program appears to be satisfactory. The vendor witnessing program is an asset and appears well managed. Other than the missing timetable for the vendor audit program, the conduct of audits and vendor annual evaluations appears to be well managed. Personnel in the procurement QA staff appear to be knowledgeable and professional in their work.

C. Equipment Turnover and Preoperational Testing

References:	CP-SAP-3,	Custody Transfer of Station Components
	STA-802,	Final Acceptance of Station Systems, Structures, and Equipment
	CP-SAP-21,	Conduct of Testing

a. General

The processes of turnover of safety related equipment from construction to startup as well as pre-requisite and pre-operational testing of said equipment were reviewed in order to determine if:

(1) The method employed for transferring custody of components, partial subsystems, subsystems or systems from construction to startup; the return of equipment to construction for rework or modification; and the ultimate release of custody from startup to operations are technically and administratively adequate.

(2) The administrative controls over preoperational testing are technically and administratively adequate.

(3) The preoperational test procedures both performed and yet to be performed are technically viable and administratively sufficient.

b. Review Effort

(1) Equipment Turnover

The turnover of safety related equipment from Construction to Startup is administratively controlled by Startup Administrative Procedure CP-SAP-3, Custody Transfer of Station Components. This procedure establishes the requirements and responsibilities for transferring custody of components, partial subsystems, subsystems or systems from:

(a) Construction to Startup

(b) Startup back to Construction for rework or modification

(c) Startup to Operations

The Startup group determines the turnover boundaries necessary to perform pre-operational testing activities. The Completions Group (a subgroup of Startup) assembles the turnover packages consisting of equipment, valve, piping and instrument lists, drawing lists such as flow, instrumentation and control, and auxiliary one-line diagrams as required to sufficiently describe the content and boundaries of the turnover.

The Completion Group is also responsible for initiating and processing turnovers consistent with established schedules in the turnover package, such as to:

(a) identify the equipment

(b) indicate the scope of the turnover

(c) assemble the late revisions of the appropriate diagrams/ prints and applicable design change documents (DCA's)

(d) list deficiencies, including design changes that have not been implemented

The Completion Group coordinates all required pre-turnover walkdowns and punchlist activities for the purpose of establishing the status of remaining work to be done prior to turnover of that equipment to startup.

Startup personnel review the packages and perform a walkdown of the equipment/system to determine if the equipment identified in the package is ready for turnover. Any deficiencies requiring resolution prior to turnover are resolved prior to transfer; those deficiencies not requiring pre-turnover resolution are added to the Master Data Base (a computerized tracking system) to facilitate future disposition. Upon completion of the startup walkdown and correction of required deficiencies, custody/turnover of the equipment is transferred to startup.

Custody of station components may be returned to construction for performance of work such as major modifications, repair or clearing of construction deficiencies. The return of equipment to construction voids all preoperation testing on said equipment.

After the completion of applicable prerequisite tests, (construction tests), including initial operation of the equipment, startup may relinquish "operational control" to Operations yet maintains custody of the equipment pending completion of preoperational testing.

The turnover packages for the following systems were reviewed:

(a) Component Cooling

(b) Auxiliary Feedwater

(c) Containment Spray

(d) Chemical and Volume Control

(e) Residual Heat Removal

(f) Safety Injection

(g) Hydrogen Recombiners

(h) Reactor Protection System

The turnover of equipment from Startup to Operations is detailed in Station Administrative Procedure STA-802 Final Acceptance of Station Systems, Structures and Equipment. Pursuant to that Procedure, Operations initiates a detailed review of the turnover package and walks down the applicable equipment. Following successful completion of the reviews and walkdowns, Operations accepts the equipment/area. At this time all responsibility for that equipment lies with operations.

There has been no safety related equipment transferred to operations, thus the review of the process was in terms of programmatic sufficiency.

(2) Preoperational Testing Program

The preoperational test program was reviewed in order to verify that the tests to be performed have been identified and that each of the identified tests entailed at a minimum, test objectives, summary of the test, necessary prerequisites, and acceptance criteria.

The test organization was reviewed in order to verify that the lines of authority and responsibilities of test personnel are specified and that where interfaces exist between organizations involved in the test program, that organizational responsibilities are clearly established.

The administration of the test program was reviewed in order to verify that methods are established to receive (from construction) the jurisdiction over systems before commencement of testing.

The administrative mechanisms established for jurisdiction control of systems before, during, and after testing were reviewed in order to verify that those mechanisms adequately provide for: control of system status before preoperational testing including the completion of adequate prerequisite (construction) testing; the return of systems to Construction if necessary to support modifications and/or reports; the control of system status subsequent to testing including measures necessary to prevent invalidation of test results; the control of the system during testing; only the assigned System Test Engineer or his designate may conduct system testing.

The conduct of testing was reviewed in order to verify that adequate administrative measures provide for: methods to change a test procedure during the conduct of testing; the criteria for interruption of a test and continuation of an interrupted test; methods to coordinate the conduct of testing; methods to document significant events, unusual conditions or interruptions to testing; methods for identifying deficiencies, documenting their resolution and documenting retesting; methods for providing the current test procedure to operations and coordinating test activities with the shift supervisor; methods to ensure that the systems test engineer has the appropriate latest revision of the required documentation/references.

The program for evaluation of test results was reviewed in order to determine that: deficiencies are clearly identified and appropriate corrective action proposed, reviewed and completed; subsequent to corrective actions or modifications have been completed, tests or portions of test have been rerun as necessary to ensure that tests of the as-built system are adequate; the results of the evaluations were reviewed by the appropriate licensee personnel responsible for approving the original procedure.

(3) Prerequisites Tests

Selected prerequisite tests were reviewed in order to determine if the tests provide and adequate mechanism of accomplishing vital testing and operation of the associated equipment. The tests reviewed appeared technically and administratively sufficient. The prerequisite tests when performed in compliance with Startup Administrative Procedure CP-SAP-21, Conduct of Testing, and as required by the applicable preoperational tests, appear to provide an adequate mechanism for initial equipment checkout and operation.

(4) Preoperational Tests

Selected preoperational test procedures for tests which are yet to be performed, were reviewed in order to ascertain adequate implementation of the following:

(a) Management review and approval

(b) Procedure format with emphasis on clarity of testing required

(c) Clarity of test objectives

(d) Pertinent prerequisites identified, e.g.

1) required plant systems are specified

2) proper facility procedures and other references are specified and uniquely identified

3) completion of calibration checks, limit switch setting protective device setting, included where applicable

4) special supplies, and test equipment specified.

(e) Special environmental conditions, if any, identified.

(f) Acceptance criteria are clearly identified and the procedure requires comparison of results with acceptance criteria.

(g) The source of the acceptance criteria is identified, i.e., FSAR, T/S, Reg. Guide, engineering drawing, etc.

(h) Initial test conditions are specified

1) Valve line-ups

2) Electrical power and control requirements

3) Temporary installations (instrumentation, electrical, and piping)

4) Temperatures, pressures, flows

(i) The procedure includes reference to appropriate FSAR sections, T/S, drawings, specification, codes and other requirements.

(j) Step-by-step instructions for the performance of the procedure are complete to the extent necessary to assure that test objectives are met.

(k) Provisions are available for documenting that all items, including prerequisites, are verified as having been performed.

(l) Provision is made for recording details of the conduct of the test including observed deficiencies, their resolution, and retest.

(m) Procedure requires that temporary connections, disconnections or jumpers be restored to normal or refers to another procedure.

(n) Procedure provides for identification of personnel conducting the testing and evaluating the test data or refers to another procedure.

(o) Procedure provides for independent verification of critical steps or parameters, including QA holdpoints.

These procedures included but were not limited to the following:

1-CP-PT-11-01	Component Cooling
1-CP-PT-29-2	D/G Control & Functional

1-CP-PT-48-01	Containment Spray
1-CP-PT-49-02-RT-1	CVCS - Seal Water & Letdown Performance Retest
1-CP-PT-49-03-RT-1	CVCS - Chemical Control Purification and Makeup Retest
1-CP-PT-57-01-RT-1	SI Pump Performance Retest

Selected completed preoperational procedures were reviewed in order to ascertain, at a minimum that:

(a) The licensee is performing an adequate evaluation of test results.

(b) All test data are either within previously established acceptance criteria, or that deviations are properly dispositioned.

(c) The licensee's methods for correcting deficiencies and for retesting are adequate.

(d) The adequacy of the licensee's administrative practices in maintaining proper test discipline concerning test execution, test alteration, and test records.

(e) The licensee is following his procedures for review, evaluation, and acceptance of test results.

These procedures included, but were not limited to:

1-CP-PT-57-06	RHR - ECCS
1-CP-PT-67-01	Hydrogen Recombiner
1-CP-PT-64-02	Reactor Protection System
1-CP-PT-57-02	Centrifugal Charging Pump
1-CP-PT-57-01	SI Pump Performance
1-CP-PT-48-01	Containment Spray
1-CP-PT-29-04	D/G Sequencing
1-CP-PT-02-08	Class I-E Switchgear

(5) Systems Status

System walkdowns were performed in order to determine the current status of safety related components/systems. The following systems, among others were selectively reviewed in that assessment:

(a) Residual Heat Removal
(b) Chemical Volume and Control
(c) Safety Injection
(d) Containment Spray
(e) Auxiliary Feedwater
(f) Component Cooling

Preoperational test status reports were also reviewed and interviews conducted in order to assess the current status of completed and remaining testing. The review revealed that of the 198 original preoperational test procedures, 45 have yet to be performed; of the 34 preoperational/retest procedures, 33 have yet to be performed; that of the 39 preoperational/reperform procedures, 37 have yet to be performed. Thus of 271 total procedures, 115 or 42% have yet to be performed. It should be noted however that the "Retests" and "Reperforms" are, as a general rule, much less in scope than the original preoperational test and as such should require less time to complete. Further the "Retests" and "Reperforms" will be run on essentially "debugged" systems, thus should run much smoother than the original tests. (Note: The retests and reperforms were necessitated by extensive electrical rework and station modifications.)

There is no preoperational testing currently ongoing, nor has there been any significant testing in the past 10 months, the result of the aforementioned electrical rework and other modifications. Plans are currently underway to recommence preoperational testing during the month of April 1984.

A statistical analysis of the preoperational testing which has been performed, spanning the period of July 1982 to June 1983, in essence the period immediately proceeding a virtual shutdown of testing necessitated by the modifications as aforementioned, revealed that in that 11 month period, 177 of the 198 original tests were performed. This calculates to be an average of 11 tests completed per month. Applying this rate to completion of the total testing remaining, 115 tests, it would take approximately 10 months to complete the preop program. If, however, one assumes that rate would apply only to the original preoperational tests, not the retests or reperforms, and a valid assumption that the retests and/or reperforms can be run in conjunction with or at least during the time frame of the preop tests, then the 45 remaining original preops can be run in 4 months. Assuming preop testing resumes in April 1984 as planned, preop testing could conceivably conclude by August 1984, if no major undisclosed problem is identified.

It should be noted that a mechanism/method now embraced by the utility to facilitate turnovers, is that of room/building turnovers in conjunction with the equipment inside. This is cumbersome and could impact preoperational testing. Preoperational testing is performed on a system related basis, thus if a system is complete, yet the room in which the system is placed is not (i.e., painting, etc.), preoperational testing may be, and is under the current program, delayed until room turnover. (Note: See Section A for changing completion methodology).

c. Conclusion

Based on the above limited review, the following conclusions were formed:

(1) The administrative process of custody transfer of systems appears to be adequate.

(2) The preoperational test program appears to be intact, viable and adequate.

(3) Preoperational tests appear to be technically and administratively adequate.

(4) Preoperational testing could conclude by August 1984.

D. Electrical

References:	QI-QP-11.2-3,	Torquing and Spacing of Concrete Anchor Bolts
	QI-QP-11.3-23,	Class 1E Conduit Raceway Inspection
	QI-QP-11.3-26,	Electrical Cable Installation Inspection
	QI-QP-11.3-27,	Class 1E Power Cable Meggering
	QI-QP-11.3-28,	Class 1E Cable Terminations
	QI-QP-11.3-29.1,	Verify Electrical Separation
	QI-QP-11.3-38.1,	Installation of Class 1E Electrical Equipment
	QI-QP-11.3-40,	Post Construction Inspection of Electrical Equipment and Raceways
	QI-QP-11.3-42,	Electrical Inspection of Seismic Category 1 Instrumentation Rack Assemblies
	QI-QP-11.10-1,	Inspection of Seismic Electrical Support and Restraint Systems
	QI-QP-11.3-50,	Cable Grip Support Installation Inspection

a. General

The assessment in this area was to determine if safety-related electrical equipment was being installed and inspected in accordance with NRC requirements and licensee commitments and to determine if Texas Utilities Services Inc., (TUSI) programs which includes drawings, procedures, quality control and construction inspections, and quality records are adequate to accomplish work in this activity.

Discussions were held with craftsmen and other Comanche Peak Steam Electric Station (CPSES) project personnel to determine their ability and knowledge to carry out their individual responsibilities and to evaluate their morale and opinion with regard to the Comanche Peak nuclear project. No adverse comments were made by the Comanche Peak project employees and all considered the project to be of high quality construction.

The licensee recently organized his manpower into a Building Management Organization (BMO) to make the most efficient use of project resources. There are four main BMOs - Containment Building, Safeguards Building, Auxiliary Building, and Electrical Control Building. Each organization is an integrated group of engineering, construction, and QA personnel. This group supports the effort to complete the construction in their area of assignment under the direction of a Building Management Director. The department supervisors are responsible for the technical direction of their personnel, and QC personnel report to the applicable QA Department manager. There is an exchange of problems and resolution of problems among the project personnel and bi-weekly BMO meetings.

As a room or area is considered nearly complete an Electrical Separation Verification (QI-QP 11.3-29.1) is performed on the room and/or area. The completion or near completion of the final Electrical Separation Verification items usually triggers the Post Construction Inspection of Electrical Equipment and Raceways (QI-QP-11.3-40). When both these procedures are complete, or essentially complete, and/or at the discretion of the BMO director, the room and/or area becomes controlled. Access is limited to correct minor outstanding deficiencies or complete other known outstanding work. The BMO Director determines when this room and/or area is to be turned over for an inspection and acceptance by the Stations Startup and Test Group. This turnover usually follows the inspections and completion of most of the deficiencies found during the performance of QI-QP 11.3-29.1 and QI-QP 11.3-40.

An inspection walk down was performed on many of the rooms/areas that the BMO Director considered to be essentially complete. This walkdown showed that the rooms/areas were clean, that electrical/mechanical separation, including barriers, cable tray attachments, identification of cable trays, conduits, and cables, cable tray fill and cable spacing (where applicable) in trays, and cable supports (Kellen grips or equivalent) were satisfactory.

b. Review Effort

(1) Review of Quality Assurance Implementing Procedures

The referenced procedures were examined to assure that FSAR requirements and commitments were being complied within the areas relating to the installation and inspection of electrical equipment and components.

These procedures provided check lists and acceptance criteria for QC inspector.

(2) Electrical Cable Installation

The following installed safety-related (S/R) electrical cables that had been accepted as satisfactory by site construction QC inspectors were examined. A physical examination was made to determine compliance with applicable design and installation criteria relative to type, location/routing, identification tags at termination points, minimum bend radius (where applicable), cable color compatible with designated raceways and separation of trains, excluding barriers, which are performed prior to or concurrent with QI-QP-11.29-1, "Verify Electrical Separation." The routing was checked by using a signal generating device.

Cable No.	Type	From	To
EG100483	3/C No. 10AWG	MCC1EB2-1	MOV 1HV5540
EG113626	9/C No. 12AWG	MCC1EB2-1	CP1ECPRTC08
EG113646	9/C No. 12AWG	MCC1EB2-1	CP1ECPRTC05
EG112219	2/C No. 12AWG	MOV 1HV4759	CP1ECPRTC05
EG100497	3/C No. 8AWG	MCC1EB2-1	MOV 1HV4759
EG112216	5/C No. 12AWG	MCC1EB2-1	MOV 1HV4759
EO100009	1/C No. 4/0AWG	SWGR1EA-1	TBXCSAPCH01
EO112206	5/C No. 12AWG	MCC1EB3-1	MOV 1HV4758
EO112207	7/C No. 12AWG	MCC1EB3-1	CP1ECPRTC04
EO112209	2/C No. 12AWG	CP1ECPRTC04	MOV 1HV4758

The cable identification is accomplished by an alphanumeric coded tag and by the color of the cable jacket. The first character of the alphanumeric code indicates whether the cable is safety or channel oriented (E), associated train (A) or non-safety (N). The second character identifies the color of the cable jacket and with respect to safety-related (S/R) applications they are "O" (Orange), "G" (Green), "W" (White), "B" (Blue), "R" (Red) and "Y" (Yellow). All cables are to be tagged with their unique alphanumeric number at termination points in equipment and junction boxes. Cables that enter and leave a junction box but are not terminated in that junction box are not required to be identified in that box with their alphanumeric number. All of the above cable were properly identified.

The routing of the above cables was checked with signal tracers. Using this method, junction box covers, cable tray covers, fire barriers and other items did not have to be removed. This check showed that cable tray systems and conduits appeared to be properly installed with proper attachments and supports, that these systems were properly identified, and that the cables travelled the route indicated on the cable pull cards.

QC records showed applicable inspections were made in accordance with the following procedures:

(a) QI-QP-11.3-26, Electrical Cable Installation Inspection
(b) QI-QP-11.3-27, Class 1E Power Cable Meggering
(c) QI-QP-11.3-28, Class 1E Cable Terminations

(3) Electrical Cable Termination

A physical examination was made on terminations of selected class 1E electrical cables in the Hot Shutdown Panel on elevation 832' of the unit 1 safeguards building. The examination verified that terminations were in compliance with requirements, including proper lug material and size, accurate location, and identification of terminal block and conductor. The cable wiring diagram was used to determine the proper termination points and conductors identification. Cable Terminations that were checked were for cables EG104556, EG111148, EG104551, EG139204, E0104791, E0104740, E0122101, E0104742, E0130596, and E0122103.

The QC records showed that inspections were made on these terminations in accordance with QI-QP-11.3-28, "Class IE Cable Terminations."

QI-QP-11.3-40, "Post Construction Inspection of Electrical Equipment and Raceways" states: "Separation between field run redundant Class 1E cables and Class 1E/Non-Class 1E cables within a cabinet shall be maintained in accordance with the equipment specification. If the specification gives no separation requirements, the minimum separation distance between redundant Class 1E and Class 1E/Non-Class 1E cables shall be greater than or equal to 6 inches. In cases where the above separation criteria cannot be maintained, barrier shall be installed between the cables." Acceptable barriers include the following:

(a) Metallic conduit; including Servicair Company FC 33 flexible conduit

(b) Two sheets of fire retardant material separated by a minimum of ¼" of air space or thermal insulating material

(c) A single barrier with a 1" maintained air space or thermal insulating material between the components or devices and the barrier

During the cable termination inspection in the Hot Shutdown Panel, it was noted that barriers were installed but there still existed some separation problems. The licensee's representative indicated that QI-QP-11.3-40 inspection had not been performed on the panel and that the remaining barriers would be installed as needed to meet the separation criteria before QI-QP-11.3-40 was signed off for that room or panel.

To insure that internal electrical separation in panels was being adhered to, several panels in which QI-QP-11.3-40 was essentially complete were examined. These panels were located in the cable spreading room and control room. The panel examined included termination cabinets TC-22, 23, Auxiliary Relay Panels 1, 2, and 5. These panels showed that internal separation was satisfactory even though work was still in process in some of these panels.

During the inspection for electrical separation in the above panels it was noted that some cables in the panels were being spliced. This was was determined to be satisfactory and meets FSAR commitments which state in paragraph 8.1.5.2.5., "Wire splices are used in limited applications on field cables that terminate in certain Class 1E panels, cabinets or racks. The normal design is to terminate field cables without the use of wire splices. The wire splices are only used where additional length is required for the field wire and it was not judged reasonable to pull a new field cable. The use of such wire splices has been minimized. The wire splices are butt splices. The crimping technique, device and materials used for the splices are identical to those used for the terminal lugs in that panel. The wire splices are only allowed on low power applications such as control cables. Since previously accepted crimping methods and materials are used, the splices are limited to low power circuits and to field cables that already terminate in the panel, and the required wire separation and wire bundles support is maintained..."

Interviews with CPSES project personnel which were conducted by other members of this review team indicated that there may be a problem with cable terminations to Weidmuller Terminal Blocks. These terminal blocks employ a screw clamp connection. The manufacturer's literature for these terminals blocks states, "The screw clamp" refers to a connection in which the wire is stripped of its insulation to a recommended length and clamped without any further preparation. A screw clamp and current bar are used to insure the connection; and since the clamping screw does not make direct contact on the wire, damage is prevented." As inspectors were making inspections for QI-QP-11.3-40, "Post Construction Inspection of Electrical Equipment and Raceways," they would tug and flex the conductor to insure that the connection was tight. This action caused the conductor wire strands to slightly spread and thereby reducing the tightness of the screw clamp connection. Since these connections were previously verified as satisfactory per QI-QP-11.3-28 "Class 1E Cable Termination" inspections and the fact that equipment may be energized, the licensee now calls for a visual inspection with regard to QI-QP-11.3-40 termination checks.

The Weidmueller Terminal Blocks used at CPSES are qualified per the manufacturer's literature for nuclear applications including environmental qualification. Tests for this qualification were performed by Franklin Research Center and are documented on their reports FC 4959 and 5205.

(4) Electrical Conduit and Cable Tray Installation

Conduit and cable tray raceway systems were inspected in rooms and/or areas in which both QI-QP 11.3-29.1, "Electrical Separation Verification" and QI-QP 11.3-40, "Post Construction Inspection of Electrical Equipment and Raceways," were essentially completed and access to these rooms and/or areas were controlled. This inspection was to verify completeness of work in the electrical area, including electrical separation, power cable spacing in trays and cable supports on vertical runs of cable systems. All items were condidered to meet construction criteria.

Specific Conduit System checked including support and spacing were:

Conduit No.	Location	Remarks
C13005319	Safeguards Bldg #1, Elev 773, Room 56S	Access Controlled
C1304036	Safeguards Bldg #1 Elev 773, Room 56S	Access Controlled
C13012998	Safeguards Bldg #1 Elev 773, Room 56S	Access Controlled
C13010777	Safeguards Bldg #1 Elev 773, Room 56S	Access Controlled
C14013679	Safeguards Bldg. "1 Elev 773, Room 54	Access Controlled
C22G08188	Aux. Bldg. Elev. 790 Various Rooms	Only Room 170 was Access Controlled
C22G08189	Aux. Bldg. Elev. 790 Various Rooms	Only Room 170 was Access Controlled

The inspection of these conduits showed that they were installed to the construction requirement and that electrical separation was satisfactory. QC records for these conduit systems showed that applicable inspection were made in accordance with the following procedures:

QI-QP- 11.3-23,	Class 1E Conduit Raceway Inspection
QI-QP- 11.2-3,	Torquing and Spacing of Concrete Anchor Bolts

QI-QP 11.10-1, Inspection of Seismic Electrical Support and Restraint Systems
QI-QP 11.3-29.1, Verify Electrical Separation [For Room 56S, Inspection Report (I.R)# E-1-0013485/3-84; for Room 54, IR# E-1-0013480/3-84; for Room 170, IR# E-1-0017514/1-84]

Several additional conduit runs were examined in the field to verify electrical separation. These conduit runs were located in the cable spreading area and are identified below:

(a) Conduit C12019C32, orange safety train, goes under ladder tray T16GCCM02, green safety train, at one point and separation is approximately 6 inches. At another point it goes over ladder tray T14GCDH41, green safety train, and separation is approximately 2" with a barrier installed between the two.

(b) Conduit C15R10537, red protection channel, at one point goes under ladder tray T13GCCM15, green safety train, and separation is approximately 2 inches.

(c) Conduit C15B11396, blue protection channel, at one point goes under ladder tray T13OCCMO, orange safety train, and separation in approximately 2 inches.

(d) Conduit C12G21191, green safety train, goes under solid tray T14OCDJ31, orange safety train, and separation is approximately 3 inches.

The above are acceptable per QI-QP 11.3-29.1 "Verify Electrical Separation" and Gibbs and Hill Specification 2323-ES-100 Section 4.11.3.2.

Spacing of power cables in trays is to follow requirements of Gibbs and Hill Specification 2323-ES-100 section 4.2.1.4., which in essence, states that minimum spacing between power cables shall be a minimum of one quarter of the diameter of the largest cable. The spacing of cables in the following trays and rooms were considered to meet this requirement:

Tray Numbers	Location	Electrical Separation Verification per QI-QP-11.3-29
T12OABA05-12	Room 174, Aux. Bldg.	Not complete
T12OABB01	Room 174, Aux. Bldg.	Not complete
T11OAA01-05	Room 174, Aux. Bldg.	Not complete
T11OSAA30	Room 54, Safeguards Bldg.	Complete

T120ABA96*	Room 219, Aux. Bldg.	Approx. 90% complete
T11GAAB11*	Room 214, Aux. Bldg.	Complete
T120ABA98*	Room 241, Aux. Bldg.	Approx. 90% complete
T120ABA47-50	Room 241, Aux. Bldg.	Approx. 90% complete
T120ABB93	Room 219, Aux. Bldg.	Approx. 90% complete

*Asterisked trays contained vertical runs of cable. Cables were supported properly by Kellem Grips in accordance with QI-QP-11.3-50, "Cable Grip Support Installation Inspection."

A review of some of licensee Inspection Reports (IRs) that were performed for QI-QP-11.3-29.1 "Verify Electrical Separation" showed that I.R E-1-0024985 of 2/28/84 and IRE-1-0036072 of 4/12/84 applied to the same room (room 219) in the auxiliary building. Neither of these reports indicated that they were performed as a result of a specific job or Inspection Item Removal Notice (IRN). Both were designated as final inspections. It is recognized that the licensee can perform re-inspection as deemed necessary; however, it is considered that there should be only one final inspection for post construction work. If additional final inspections are required in this area for IRN's, Design Change Authorizations (DCA), etc., they should be referenced in the remarks section of the IR. The one "final" electrical separation inspection, which could be performed concurrent or before QI-QP-11.3-40 "Class 1E Electrical Post Construction Verification," would indicate that electrical work in this area in almost complete and would aid in triggering the performance of QI-QP-11.3-40. The licensee stated that this area would be reviewed to see if the "final" inspection in this area could be clarified.

c. Observation and Conclusions

There appears to be a good working interface between construction inspectors and the craft. For the most part the electrical construction inspectors appear to be knowledgeable and conscientious in their work areas. The inspector encountered no cases of hostility or harassment with the Comanche Peak Project employees.

E. Design Activities/Design Control

References: QI-QAP-11.1-28, Rev. 23, Fabrication, Installation Inspections of ASME Component Supports, Class 1, 2, and 3

QI-QAP-11.1-28A, Rev. 5,	Installation Inspections of ASME Class 1, 2, and 3 Snubbers
Procedure AB-5, Rev. 5,	A Simplified Method for Design and Analysis of Small Size Piping
TUSI Engineering Guidelne,	Section IV, Base Plates, Rev. 11
CPSES, XCP-ME-10, Rev. 1,	Pipe Support Adjustments
TUSI CP-EI-4.5-1, Rev. 9,	General Program for As-Built Piping Verification
TUSI Engineering Guideline, Sectopm II	Section II, General Engineering Criteria for Pipe Support Design, Rev. 8
Specification 2323-MS-46A, Rev. 5	Nuclear Safety Class Pipe Hangers and Supports
Construction Procedure 35-1195-CCP-9, Rev. 4,	Field Surveys
TUSI CP-EI-4.6-9, Rev. 1,	Performance Instruction for Piping Analysis by SSAG
TUSI Engineering Guideline, Section V, Rev. 3	Hilti Concrete Anchor Bolts

ADLPIPE, Static and Dynamic Pipe Design and Stress Analysis, Arthur D. Little, Inc., May 1981

a. General

The organization of the general site engineering, construction, and procurement efforts were defined in procedure CP-EP-3.0. By this procedure, the Prcject Manager is responsible for the Comanche Peak Steam Electric Station (CPSES) design and engineering. These activities are normally delegated to Gibbs and Hill, Westinghouse, and other organizations. However, the licensee, (TUGCO) retains overall responsibility for design activities and performs design functions as necessary. The TUGCO Engineering Manager is responsible for the general direction of engineering activities.

FSAR Chapter 3 provided the licensee's requirements for the design of structures, components, equipment, and systems. The reviewer selected samples in pipe support design, piping stress analysis, and design procedure applications to verify program implementation, to ensure site procedures, site interface procedures, and design interface procedures satisfy NRC requirements and licensee commitments.

b. Review Effort

The reviewer held discussions with the design engineering personnel in the pipe support group to determine whether they understood the applicable design control procedures; whether they were able to verify design parameters that were within the applicable criteria and/or design specifications; and whether the person doing the design review was independent from the individual who performed the design. The reviewer also held discussions with the engineering personnel in the piping system Site Stress Analysis Group (SSAG) to determine whether they performed their work activities in accordance with established instructions, procedures, and specifications. The seismic response spectra with respect to operating basis earthquake (OBE) and safe shutdown earthquake (SSE) were discussed with the responsible engineers. It was noted that these seismic response spectra were furnished by the A/E's (Gibbs and Hill, Inc.) home office to the site stress group to be used for the piping system analysis. The following major areas were reviewed to determine a conclusion:

(1) IE Bulletin 79-02, Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts, Requirements

(a) Factor of Safety for Concrete Expansion Anchor Bolts Design

A review of the Pipe Support Engineering Guidelines Manual, Section V, revealed that a factor of safety of five (a more conservative value) has been used for establishing the allowable loads (tension and shear) for the wedge bolt calculation. In accordance with the vendor (Hilti) design manual and the NRC IE Bulletin 79-02 requirements, the factor of safety of four could be used (Comanche Peak pipe support installations use Hilti wedge bolt only). As noted above, the safety factor used exceeded the requirement.

(b) Pipe Support Base Plate Design

IE Bulletin 79-02 states that pipe support base plate flexibility be accounted for in the calculation of anchor bolt loads. Discussions with the responsible engineers indicated that the pipe support group personnel do consider base plate flexibility into their design calculations. Finite element method (base plate flexibility consideration) has been used for non-typical (other than four anchor bolts in one plate) base plate analysis. FUB II base plate program has been utilized for all typical (four anchor bolts in one plate) base plate analysis. The FUB II program generally produces loads which are about 25% higher than the loads generated by the Finite Element Method. In fact, many base plates were analyzed by the more conservative program, FUB II computer application (developed by ITT Grinnell Corp.). This approach exceeds the NRC requirements.

(c) Anchor Bolt Tension - Shear Interaction

IE Bulletin 79-02 permits a formula to be used for calculation of bolt tension-shear interaction. This formula can be interpreted from a linear distribution to an elliptical distribution. Comanche Peak pipe support group has elected to use a linear distribution (a conservative approach) for all concrete expansion anchor bolt calculations.

(2) IE Bulletin 79-14, Seismic Analysis for As-Built Safety-Related Piping Systems, Requirements

This bulletin states that the seismic analysis input information conforms to the actual configuration of safety-related piping systems. Licensees are requested to verify: pipe run geometry; support and restraint design, locations, function and clearance; embedments; pipe attachments; and valve and valve operator locations and weights. To accomplish the above requirements, the site pipe support group and the site stress analysis groups are responsible for verification based on as-built configuration. The as-built configuration is identified by a field survey team. This field survey team, which consists of three surveyors and one QA inspector, is to perform field measurements by utilizing equipment such as transits, levels, theodolities, etc. The high accuracy of the information obtained through the field survey is a highlight for implementing the IE Culleting 79-14 requirements.

(3) Alternate Analysis for Small Bore Piping Systems

The reviewer examined portions of procedure AB-5, A Simplified Method for Design and Analysis of Small Size Piping, Rev. 5, May 1982. It was noted that the procedure was developed by Gibbs and Hill, Inc., in a very conservative manner in terms of thermal load and seismic load calculations. Furthermore, approximately 30% of small bore (2 inches and under) low energy pipe lines in Unit 1 and 10% in Unit 2 are analyzed by the Alternate Analysis Method (i.e., a simplified method for design and analysis of small size piping). The balance of small bore piping is analyzed by the computer application.

(4) Rigorous Analysis for Safety-Related Piping Systems

Most of the safety-related piping systems are analyzed by the rigorous analysis method. The computer program involved in the analysis is one of the typical programs being used in the industry. This computer program, ADLPIPE Static and Dynamic Pipe Design and Stress Analysis, has been developed and updated by Arthur D. Little, Inc., since the early 1960s.

(5) Iterative Design Process

The reviewer held discussions with responsible licensee representatives in the area of safety-related pipe supports and piping systems. It was noted that the Iterative Design Process was utilized for implementing the design of pipe supports and the analysis of piping systems. In accordance with the licensee's description: "the process for the design of piping and supports is iterative in nature. It is unrealistic to expect to design piping and supports to satisfy all applicable requirements the first time through the process. Such an iterative design approach is employed throughout the nuclear industry, and is utilized in the design of other nuclear components as well." The reviewer noted that the practices at Comanche Peak are not unusual compared to practices at other nuclear facilities in terms of using the iterative design process in the area of designing pipe supports and piping systems.

(6) Review of Design Calculations for Pipe Support

Support No.	Pipe Size	Piping System
AF-1-002-705-S33K, Rev. 3	10" dia.	Auxiliary Feedwater
CC-1-158-701-A43R, Rev. 2	16" dia.	Component Cooling
SI-1-031-709-A32R, Rev. 2	12" dia.	Safety Injection
SI-1-029-702-S32R, Rev. 2	24" dia.	Safety Injection
BR-1-AB-001-005-3, Rev. 1	2" dia.	Boron Recycle

The above design calculations were randomly selected and were partially reviewed for conformance to analysis criteria, applicable codes, NRC requirements, and the licensee commitments. Furthermore, these calculations were evaluated during the review for thoroughness, clarity, consistency, and accuracy. Deflection criteria used for support design were discussed with the responsible engineers and were partially verified. Weld size calculation and snubber size determination were also verified for adequacy. In general, the design calculations appeared to be adequate in terms of using design input, reference, units (dimension, force, and moment), equations, tables, and sketches.

(7) Review of Stress Analysis for Piping Systems

Calculation No.	Piping System
AB-1-19A	Safety Injection
AB-1-30	Containment Spray
AB-1-69	Residual Heat Removal and Safety Injection
AB-1-135E	Auxiliary Steam and Main Steam
AF-1-SB-006	Auxiliary Feedwater
AF-1-SB-007	Auxiliary Feedwater

The above piping stress analyses were partially reviewed for conformance to design specification, applicable code, NRC requirements, and the licensee commitments. These analyses were also evaluated for thoroughness, clarity, consistency, and accuracy. The NRC reviewer examined portions of the seismic inputs to be used in the stress analysis. These seismic inputs in terms of periods versus accelerations from the corresponding floor response spectra curves under OBE and SSE conditions were partially verified for accuracy. Furthermore, the reviewer held discussions with the responsible engineers to ensure that seismic anchor movement, nozzle thermal movement, and valve orientations were properly considered in the stress analysis.

During the review the reviewer examined piping system AF-1-SB-006. This 3/4" diameter vent and drain pipe was analyzed for support requirements. Results from the analysis revealed that no pipe supports were needed for the pipe. However, the reviewer noted that a Component Modification Card (CMC) No. 90567 was issued to the pipe in that a piece of tee (pipe) was added to the vent and drain system. The pipe support group accepted this CMC without performing detailed evaluation. The responsible engineer stated that this CMC was reviewed by a well qualified engineer. Based on his engineering judgement, no detailed calculations were required. The inspector indicated that a detailed evaluation for this CMC was needed. In addition, a sampling program should be initiated to ensure that no other similar CMCs were accepted without performing detailed evaluation. The responsible licensee representative took immediate action to perform detailed calculations for the vent and drain piping system due to the addition of the CMC (No. 90567). Furthermore, a sampling program was immediately initiated to review 50 other similar packages. This matter will be identified to the Comanche Peak Project Director for followup.

Results from the detailed calculations revealed that no pipe supports were required for the vent and drain piping system as the original evaluation indicated. Results from the sampling program showed that no discrepancies were identified for the 50 other similar packages.

Piping system AF-1-SB-007 was partially reviewed. It was noted that portions of the calculations were not performed in accordance with established procedures. Some minor mathematical errors were noted. One CMC was not addressed properly by the licensee reviewer. The pipe support group reanalyzed this 3/4 inch piping system by hand calculations (alternate analysis) and also by computer application (rigorous analysis). Results from the two analyses were consistent and conservative. Four pipe supports were required by the analysis. Loads used for support design were verified and were found conservative. This matter will be forwarded to the Comanche Peak Project Director for followup.

(8) Field Inspection/Verification

The NRC reviewer performed a field walkdown at the Unit 1 containment building area and noted the following discrepancies:

Support No.	Status
CC-1-218-012-C53K	Snubber connection cotter keys missing
CC-1-295-005-C53R	Sway strut installed over 5° tolerance
CT-1-038-436-C62K	Snubber connection cotter keys missing; no washers in rear bracket
CT-1-117-405-C62K	Snubber connection cotter key missing
CT-1-117-415-C62K	Snubber safety wire broken
CT-1-053-444-C62K	The south snubber was installed improperly
DD-1-046-020-C65R	Snubber cotter keys missing
FW-1-096-705-C62K	Snubber safety wire broken
FW-1-102-002-C62k	Snubber cotter key missing; needs relative adjustment on snubber
FW-1-102-003-C62K	Snubber cotter keys not bent
MS-1-151-025-C52K	Snubber installed over 5° tolerance
CC-1-RB-066-008-3	Snubber cold setting over the limit

CC-1-RB-066-007-3	Snubber cold setting over the limit
CC-1-RB-068-007-3	Spring hanger cold setting incorrect (15 lbs. versus 11 lbs.)

The above pipe supports discrepancies were verified with the licensee's QC inspector in accordance with detailed drawings. All the above pipe supports were vendor certified and were previously inspected by the licensee QC inspectors. The licensee representatives stated that a final walkdown inspection/verification for all pipe supports is to be implemented in accordance with procedure CP-QAP-12.1, Inspection Criteria and Documentation Requirements Prior to System N-5 Certification.

The majority of the discrepancies appeared to be minor problems which could be easily repaired during the final inspection prior to the system pressure test. Two of the discrepancies were more serious in that rework or reanalysis of the support would be required prior to acceptance. These supports are MS-1-151-025-C52K, Rev. 3 and CC-1-295-005-C53R, Rev. 4, which were not installed in accordance with the detailed drawings. The fact that these two supports were inspected by QC is considered as a potential enforcement item.

(9) Design Consideration for Piping Systems Between Safety-Related and Non Safety-Related Buildings

The NRC reviewer held discussions with the licensee representatives in the area of piping stress analysis and pipe support design. Stress Analysis No. AB-1-135 E for the Auxiliary Steam and Main Steam System was partially reviewed and discussed with respect to design considerations between safety-related and non safety-related buildings. The piping system was classified as high energy line and safety-related. The pipe run starts from the Turbine Building into the Electrical Control building. Since seismic classifications for the two buildings are different, the criteria used for the piping system analysis should also be different. The failure of the pipe in the Turbine Building may impose a damage to the pipe inside the Electrical Control Building if the piping system was not properly analyzed and designed. The responsible licensee representatives agreed to performed further evaluation with regard to the above concerns. This matter will be identified to the Comanche Peak Project Director for resolution.

(10) Interpretation of Tolerance for Snubber Installation

During the field review, three reviewers interviewed the licensee's QC inspectors with respect to their interpretation of five degrees tolerance requirements for strut and snubber installation. These QC inspectors appeared to be confused with the interpretation of the tolerances on the detailed drawings.

The reviewers held discussions with the licensee representatives with regard to the above concerns. It was determined that the licensee will revise the inspection procedure to clarify the strut/snubber installation tolerance and will conduct a training for all QC inspectors who are involved pipe support inspections. This matter will be identified to the Comanche Peak Project Director for followup.

(11) Final Adjustments for Spring Hangers and Snubber Settings

The reviewers held discussions with the responsible licensee representatives with regard to implementing the final adjustments for spring hangers and snubber settings. It was determined that, after the fuel loading, the licensee QA startup group will perform the final walkdown inspection to ensure that all spring hangers and snubbers be adjusted to proper position. This matter will be brought to the attention of Comanche Peak Project Director for followup.

(12) Technical Training

The reviewer held discussions with the responsible pipe support engineering (PSE) personnel to determine whether they performed their work activities in accordance with established procedures and specifications, and whether the design engineering personnel received proper training with respect to technical applications and NRC requirements.

A review of the training record revealed that since 1980, the PSE personnel have received extensive training activities in terms of technical applications and code interpretations.

Portions of the training courses are listed as follows:

	Date	Course	Attendance (Engineers)
(a)	06/16/80	Introduction to Nuclear Codes and Standards, QA for Engineers	All
(b)	10/13/80 10/14/80	ASME Code Seminar (NF Design Philosphy)	All
(c)	04/13/81	Alternate Analysis Method for Small Size Piping	26
(d)	06/21/81	Vent and Drain Piping Seismic Qualification	8
(e)	05/11/82 05/13/82	Design Verification Process	34

(f)	07/14/82 07/15/82	Pipe Support Snubber Installation (Instructed by Manufacturer)	24
(g)	07/27/82	Analysis of ASME Class 2 and 3 piping	16
(h)	11/12/82 11/16/82 11/17/82	Seismic Analysis of Pipe Supports	65
(i)	06/14/83 thru 08/06/83	Finite Element Method (including ASME 1, 2 & 3 pipin analysis)	19
(j)	06/29/83	Current Version of ADLPIPE Computer Code (Stress Analysis)	9
(k)	11/17/83	Quality - It's Your Job	All
(l)	03/08/84	Snubber Reduction Program	6
(m)	03/19/84	Stability Problem in the Design of Pipe Supports	26

The above training activities in the area of pipe support designs appeared to be effective and well administered. This observation was supported by the extensive discussions with the responsible engineering personnel and by reviewing the procedures and results of the design calculations.

c. Conclusion

Discussions with the responsible personnel revealed that the engineering personnel involved in the area of stress analysis for piping systems and pipe supports appeared to be knowledgeable. A review of portions of the alternate analysis criteria and related documents was performed. It was noted that the methods and procedures used in the criteria were conservative. A review of the eleven calculation packages indicated that computer applications were extensively used in the stress analyses, pipe support designs and, base plate and concrete expansion anchor bolt calculations. Design calculations, in general, were good.

During the review, the NRC reviewer noted that conservative considerations were found in many areas of design and analysis. These conservative considerations included: factor of safety used for concrete expansion anchor bolt calculation, computer program (FUB II) used for base plate analysis, weld stress allowables for welding connections, alternate analysis for small bore piping, and seismic loads used in design and analysis. These consecutive design considerations are considered strengths in the applicants program. Finally, the reviewer noted that the geographic location of Comanche Peak site has the lowest seismic risk in the United States in accordance with the criteria specified in Uniform Building Code.

A field walkdown inspection performed by the reviewer has resulted in various discrepancies for 14 pipe supports that had been previously inspected by the licensee's QC inspectors. This item will be referred to the Comanche Peak Project Director to perform subsequent followup to ensure that safety-related pipe supports are installed in accordance with design drawings and to verify that corrective actions with respect to the aforementioned discrepancies are adequately implemented in accordance with established procedures.

14. Installation of Safety-Related Fluid Systems

References:	(a)	QA-QAP-11.1-26, Rev. 14,	"ASME Pipe Fabrication and Installation Inspections"
	(b)	QI-QAP-11.1-28, Rev. 23	"Fabrication, Installation Inspection of ASME Component Supports, Class 1, 2, and 3"
	(c)	QI-QAP-11.1-28A, Rev. 5,	"Installation Inspections of ASME Class 1, 2, and 3 Snubbers"
	(d)	CP-QAP-12.3, Rev. 3,	"Testing Phase Quality Assurance Functions Prior to ASME Code Certification and Stamping"
	(e)	CP-QAP-12.2, Rev. 7,	"Inspection Procedure and Acceptance Criteria for ASME Pressure Testing"

a. General

The review of this area was directed to assessing the adequacy of the licensee's construction program as it pertained to installation of safety-related fluid systems required for safe operation and shutdown of the plant. The assessment was undertaken through selective examination of installed systems and installation related activities to determine whether they were accomplished in accordance with good engineering practice and with licensee commitments and NRC requirements - including the requirements of the applicable code, ASME

Section III. The review in this area did not undertake to evaluate the licensee's final checks and analysis of system piping in accordance Inspection and Enforcement Bulletin 79-14, and did not examine attachment of the fluid systems to concrete building structures.

b. Review Effort

(1) Tour of Areas Containing Safety-Related Fluid System Components

The reviewers toured the Safeguards, Auxiliary, and Reactor Buildings and the Service Water Pumping Station to observe installed safety-related fluid system components for any visually apparent signs of unsatisfactory or questionable items - such as visual weld defects, undersize welds, improperly or insufficiently supported piping, damage to more susceptible support components (e.g., snubbers), corrosion, missing or loose fasteners and spacers, etc. Only one item of concern, requiring follow-up, was identified during the tour. A spring can piping support was found to have a significant buildup of rust inside the can on the spring. The licensee was informed of this spring can, which was identified Serial No. 942-12. The rusting in this item did not appear to be so severe as to significantly impair its function but the course of the rusting and its significance to the functioning should be evaluated further by the licensee.

(2) Control of Welding Materials

The reviewers examined the licensee's control of the welding materials used in installation of safety-related piping system components at the issuance stations to verify compliance with code requirements and good practice. Specific attention was directed to the adequacy of the licensee's:

- segregation, identification, and control of filler metals, including consumable inserts
- oven storage of low hydrogen electrodes to limit moisture pick-up
- preparation of issuance records
- handling of returned filler metals
- documentation of current welder qualification limitations

The reviewers also observed areas toured in the plant, as described in (2) above, and plant areas entered for specific item inspections for evidence of inadequately controlled filler materials. No evidence of uncontrolled or improperly controlled welding materials was observed. The licensee welding material controls observed by the reviewers met or exceeded code requirements and good practice.

(3) Piping and Supports

The reviewers visually examined examples of installed runs of safety-related piping and associated supports to verify they were in accordance with good engineering practice and that they were in compliance with code requirements and with licensee drawing and procedure requirements. Three runs were selected which had most or all of their final acceptance inspections completed. Two of these were nearly ready for the final code review required for ASME certification (referred to as N-5 certification) that the installations were in accordance with the code. The third had the certification complete.

The licensee contracted the piping and support installation work to Brown and Root, Inc. This contractor was responsible for assuring compliance with code requirements, including obtaining code inspector certification therefor (on N-5 Data Reports).

Licensee procedures applicable to and utilized by the reviewers in the examination of piping and supports were examined for compliance with code requirements. The procedures were as follows:

(a)	QA-QAP-11.1-26, Rev. 14,	"ASME Pipe Fabrication and Installation Inspections"
(b)	QI-QAP-11.1-28, Rev. 23	"Fabrication, Installation Inspection of ASME Component Supports, Class 1, 2, and 3"
(c)	QI-QAP-11.1-28A, Rev. 5,	"Installation Inspections of ASME Class 1, 2, and 3 Snubbers"
(d)	CP-QAP-12.3, Rev. 3,	"Testing Phase Quality Assurance Functions Prior to ASME Code Certification and Stamping"
(e)	CP-QAP-12.2, Rev. 7,	"Inspection Procedure and Acceptance Criteria for ASME Pressure Testing"

The runs of piping and supports installed that were examined by the reviewers were described on isometric drawings. The runs examined, identified by the drawing numbers, and the examination checks made by the reviewers are as follows:

<u>Run</u>: 3" Containment Spray (ASME Section III, Class 3), Drawing BRP-CT-1-SB-019, Rev. 6

The reviewers visually selectively examined the installed safety-related piping to verify the following in accordance with the drawing, code, procedures; and good engineering practice:

- configuration
- apparent pipe size
- valve identification
- visual appearance of welds
- heat numbers on pieces 2, 10, and 18 and serial number on valve piece 14 were traceable through installation records to original receipt and acceptance records

The reviewers examined the records for the above piping to verify the following in accordance with code and procedural requirements:

- proper installation and inspection steps completed for all components
- mill test reports for all materials
- hydrostatic testing

<u>Run</u>: 2" Reactor Coolant (ASME Section III, Class 1), Drawings BRP-RC-1-RB-10, Rev. 8 and BRHL-RC-1-RB-10, Rev. 2.

The reviewers visually examined the installed piping and supports to verify the following, in accordance with the drawings, code, procedures and good engineering practice:

- configuration
- apparent pipe size
- snubber and spring can sizes
- offset for snubber RC-1-015-707-C41K
- spring can settings
- visual appearance of welds
- size of piping welds
- support serial numbers 19050, 17791 and 17789 traceable to installation and receiving records
- heat numbers on material pieces 1 and 12 that were traceable to acceptable mill test reports
- serial numbers on valves 1RC-8057A and -8058A that were traceable to installation and acceptable receiving inspection records

- visual appearance of fasteners
- snubber pins and washers
- evidence of damage to or deterioration of any components

The reviewer examined the records for the above piping and supports to verify the following, in accordance with code and procedural requirements:

- proper installation and inspection steps completed for piping
- hydrostatic testing

Run: 8" Auxiliary Feedwater (ASME Section III, Class 3),
10" Drawings BRP-AF-1-SB-006, Rev. 17 and BRHL-AF-1-SB-006, Rev. 3

The reviewers visually examined the installed piping and supports to verify the following, in accordance with the drawings, code, procedures and good engineering practice:

- configuration
- apparent pipe size
- snubber sizes and settings
- visual appearance and size of welds
- serial number on valve 1AF-031 traceable to acceptable receiving records
- snubber pins and washers
- evidence of damage to or deterioration of any components

Note: Heat number traceability could not be checked on the materials and weld quality could not be checked entirely satisfactorily as most of the components were painted.

The reviewers examined the records for the above piping and supports to verify the following in accordance with code and procedural requirements:

- proper installation and inspection steps completed for piping
- hydrostatic testing

The licensee's procedures and installation appeared to generally meet or exceed the applicable requirements and were in accordance with good engineering practice. Records proved readily retrievable and complete. Licensee QC inspectors who accompanied the NRC reviewers in their examinations of the installations appeared knowledgeable. One item of concern was noted - it was not clear what tolerance was applied to snubbers and sway struts that were installed with offsets or angles specified by drawing. This concern is discussed in paragraph E.b(10).

(4) Residual Heat Removal Heat Exchangers (RHR Hxs Supports)

The reviewers requested the licensee to identify and provide for review the bolting requirements, the drawings and the installation records for the RHR Hxs. The drawings and some of the installation records were provided. The bolting requirements were not identified and the welding records were not provided by the completion of the inspector's visit. The records and information had been requested about 1½ to 2 days before the end of the visit and licensee personnel indicated insufficient time was allowed to provide all of what was requested.

The reviewers examined the RHR Hx supports for visual weld quality (size and location were not checked) and installation of bolting. The weld quality appeared satisfactory (in accordance with code requirements). A few nuts were seen to be very loose, with many threads exposed between the nuts and the surfaces against which they would tighten. Also, the threads between the loose nuts and tightening surfaces were noted to have been painted (apparently inadvertently).

The status of the final inspections to be performed on the Hxs was unclear, but the reviewers were informed that a final inspection of welds and to verify that bolting was in place and remained to be performed.

As already indicated above, the installation records for the Hxs did not appear to be readily retrievable and bolting requirements were not readily identified by the licensee. This appears to be contradictory to the findings of the general finding of the team.

c. Conclusions

Based on their examination and findings described above, the reviewers generally concluded that the licensee's program for installation of safety-related fluid system components assures compliance with requirements, commitments and good engineering practice. As their assessment was incomplete relative installation of the Hxs described above, the reviewers recommend additional evaluation to complete the review relative to such components. This will be identified to the Comanche Peak Project Director for followup.

G. Civil Construction Activities

a. General

The objective of this portion of the review was to determine the adequacy of the implementation of the licensee's quality control/ quality assurance program for civil construction activities. During the review selected quality assurance records were examined to verify the records were complete and retrievable. Emphasis was also placed on examination of the document control system. The reviewer examined site civil design activities, including the design change process, procedures and QA records for completed work activities such as the SSI dam, selected cable tray supports, and whip and moment restraints; and procedures and work activities for ongoing work including application of protective coatings and testing of Richmond inserts. The reviewer also interviewed QC inspection personnel.

b. Review Effort

(1) Safe-Shutdown Impoundment Dam, Units 1 and 2

(a) Review of Construction and Quality Control Procedures

The reviewer examined specifications, drawings, and quality control procedures for construction of the safe-shutdown impoundment (SSI) dam. Acceptance criteria utilized by the reviewer appear in FSAR Section 2.5.4.5 and NRC requirements. Construction of the SSI dam was completed in Spring of 1977. The dam was designed by Freese and Nichols, consulting engineers, and was constructed by Brown and Root. The onsite quality control inspection activities were performed by Freese and Nichols and the firm of Mason-Johnston and Associates. Quality assurance was provided by Brown and Root site quality assurance group and the Texas Utilities Services, Inc., (TUSI) site QA surveillance group. Documents examined were as follows:

- Freese and Nichols drawing numbers FN-SSI-3 through FN-SSI-7, Safe Shutdown Impoundment Dam

- Freese and Nichols specification FNSSI-1, Contract Specification for Safe Shutdown Impoundment Dam

- Brown and Root Construction Procedure numbers 35-1195-CCP-2 through CCP-8

- Brown and Root Quality Control Procedure CP-QCP-7.1, Surveillance of SSI Dam Activities

- The Mason-Johnston and Associates Corporate QA Manual and Mason-Johnston field and laboratory testing procedures

(b) Review of Quality Records

The reviewer examined selected records which document quality control inspection and quality assurance activities during construction of the SSI dam. Acceptance criteria utilized by the reviewer are the procedures listed above. Records examined were as follows:

- Records of QA workshops conducted by Freese and Nichols and Mason-Johnson and Associates. These workshops were conducted to provide training for field inspection personnel.

- Weekly field corrective action reports for April - July 1976 and January - March, 1977.

- Results of quality control tests performed on filter materials, and impervious core materials placed between April and July 1976. These records included results of Atterberg Limits, field density tests, and proctor tests performed on the imprevious core materials, and results of field density, relative density and mechanical analysis tests performed on the Type A and B filter materials.

- Stop work orders

- Brown and Root QA Audit Reports

- Training records of QC inspection personnel

- Design Change/Design Deviation request numbers FN-81, FN-82 and FN-84

Based on review of the records, the reviewer concluded that the dam was constructed in accordance with the requirements of the construction drawings and specifications and as stipulated in the FSAR. The records were neat, legible, complete, and retrievable.

(2) Unit 1 Reactor Building Internal Pipe Whip Restraints

(a) Review of Quality Control and Construction Procedures

The reviewer examined specifications, drawings, and quality control procedures for construction and inspection of the pipe whip restraints in the reactor building. Acceptance criteria utilized by the reviewer appear in Section 3.8 of the FSAR. The pipe whip restraints are non-ASME since they are not attached to the piping. The restraints are treated as part of the reactor building internal structure and are constructed in accordance with the American Institute of Steel Construction (AISC) Standard Practices, as is all other non-ASME structural steel members (cable tray supports, structural steel building frames, stairwells, non-ASME equipment supports) in the power block. This is standard industry practice. The whip restraints were fabricated by the Chicago Bridge and Iron (CB&I) Company. Onsite installation was performed by Brown and Root. Documents examined by the reviewer were as follows:

- Gibbs and Hill Specification 2323-SS-16B, Structural Steel (Category I)
- Gibbs and Hill Drawing numbers 2323-S1-0581, 0581-01, 0584, and 0585, Reactor Building Internal Structure, Pipe Whip Restraints
- TUGCO Instruction Number QI-OP-11.14-1, Inspection of Site Fabrication and Installation of Structural and Miscellaneous Steel

The reviewer also examined the outstanding (unincorporated) design changes against the above specification and drawings. There were 29 DCAs against the specification, 12 against drawing number 0581, 3 against drawing number 0581-01, 11 against drawing number 0584, and 11 against drawing 0585. The reviewer examined the document packages maintained in DCC Satellite 306 for the above specification and drawings and verified that they were complete and contained the latest (current) revisions of the drawing and design changes.

(b) Field Inspection of Whip Restraints

The reviewer, accompanied by a QC inspector, examined pipe whip restraint numbers M-22 and M-25 which are located in steam generator compartment numbers 4 and 1, respectively, on elevation 900 of the reactor building. Acceptance criteria utilized by the reviewer are those documents listed above. Examination of these and other restraints on the 900 elevation, and discussions with the QC inspector and design engineers, disclosed the following problem. DCA number 14,813, Rev. 2, against drawing number 2323-S1-0581 revises the erection notes for the whip restraints to require installation of jam nuts (or spoiling of threads) on bolts which have nuts installed hand tight for holes noted on the drawings. Discussions with various design engineers and the inspector disclosed that there was some confusion as to where the use of jam nuts was required. In addition, the reviewer observed several locations where jam nuts had not been installed on anchor bolts where nuts had only been installed hand tight. This item will be turned over to the Comanche Peak Project Director for followup.

(c) Review of Quality Records

The reviewer examined quality records documenting construction (site erection) and QC inspection of whip restraint numbers M22, M25, and M-37 on elevation 900 of the Unit 1 reactor building. These records included weld travelers, QC inspection of structural steel bolting, QC inspection of welding, and as-built drawings showing as-built dimensions, elevation and location for the restraints. The reviewer noted that inspections for installation of jam nuts required per DCA 14813, R2, was not documented in the inspection packages. There was no resolution of this item during the review, therefore, this item will be refered to the Comanche Peak Project Director for followup and resolution. The reviewer did not examine the CB&I whip restraint fabrication records.

(3) Review of Nonconformance (NCR) 10453

The reviewer examined NCR 10453 which was written to document and disposition a problem which developed during field erection of four moment limiting component supports on the feedwater lines in the Unit 1 Safeguards Building. The supports, which are ASME components, are similar to pipe whip restraints. The purpose of the supports, which were erected around the feedwater lines, is to limit movement of the pipes during pipe break accidents. The restraints are constructed from heavy beams and columns which were fabricated offsite by CB&I. During field erection of the restraints (which was accomplished by Brown and Root) cracks developed in welds which attached small (6 inch by 9 inch) gussett plates to the columns and beams when the bolts in the beam-column connections were torqued.

The reviewer examined the NCR and discussed the corrective action with QC inspection personnel. Review of the NCR disclosed that it had been revised five times. Some of these revisions resulted from changes to the corrective action after further evaluation of the problem. Other revisions were as a result of changes to the administrative handling of the NCR, e.g., to repair all four restraints under one NCR is lieu of writing a separate NCR for each restraint. These types of revisions are normal during disposition of NCRs. Review of the NCR and discussions with responsible inspectors disclosed that the problem was resolved by removal of the damaged gusset plates (i.e., the plates where welds had cracked) from the beam and columns, non-destructive examination (NDE) of the base metal in the beams and columns at the points where the gusset plates had been attached, fabrication of new gusset plates, and rewelding of the new gusset plates to the beam columns. The reviewer examined selected quality records associated with repairs of one of the restraints, including weld travelers, PT inspection report number 19059 and 19054 and design documents including CMC 96060 and Brown and Root drawing number MSB-0683-CBI. The corrective action to resolve this NCR was completed in March 1984.

(4) Unit 1 Cable Tray Supports

(a) Review of Quality Control and Construction Procedures

The reviewer examined specifications, drawings, and quality control procedures for construction and inspection of cable tray supports. Documents examined by the reviewer were as follows:

- G&H Drawing Number 2323-E1-0713-01-S, Cable Tray Support Plan, EL 792'-0"& 790-6", Aux & Elect. Control Bldgs.
- G&H Drawing numbers 2323-S-0901, 0902, and 0903, Cable Tray Support Details, Sheets 1-3
- G&H Specification number 2323-SS-16B, Structural Steel (Category I)
- Brown and Root drawing number FSE-00185, Sheets 1-3, Reference Drawing for Cable Tray Hangers
- Brown and Root drawing number FSE-00159, sheet numbers 527, 537, 557, 2895, 2898, 2904, 2905, 2908, 12580, 12600, 12608. These are the fabrication drawings for the cable tray hanger supports. The sheet number corresponds with the hanger number.

The reviewer also examined the outstanding (unincorporated) design changes against the above G&H drawing. There were 344 CMCs and 19 DCAs against drawing 0713-01-S, 6 CMCs and 9 DCAs against drawing 0901, 4 CMCs and 10 DCAs against drawing 0902, and 26 CMCs and 29 DCAs against drawing 0903. The reviewer examined the document packages maintained in DCC Satellite 306 for the above drawings and verified that they were complete and contained the latest (current) revisions of the design changes. During examination of the design changes the reviewer noted that the majority of them were originated as a result of minor construction problems. For example, most of the design changes to drawing 0713-01-S, which is the cable tray support location plan, were as a result of interferences encountered during construction and were requested by construction personnel. These interferences required relocation of some of the supports shown on this drawing. Often the relocated supports were only moved a few inches.

(b) Field Inspection of Cable Tray Supports

The reviewer, accompanied by a QC inspector, examined randomly selected cable tray supports located on elevations 790'-6" and 792"-0" of the electrical control building. The supports and the acceptance criteria utilized by the reviewer appear in the table below.

TABLE

Support Number*	Support Type	Applicable Design Change
527	B-2 (Dwg 0901)	CMC 8250
537	D-1 W/Brace (Dwg 0901)	-
557	A-1 (Dwg 0901)	CMC 94628 DCA 1946 DCA 2687
2895	SP-2 (Dwg 0903)	CMC 50474
2898	SP-2 (Dwg 0903)	CMC 4521 CMC 2646
2904	SP-2 (Dwg 0903)	CMC 52473, R2 DCA 3494
2905	SP-2 (Dwg 0903)	DCA 6299-R7 CMC 2646
2908	B-2 (Dwg 0903)	-
12580	B (Dwg 0601-01S)	CMC 61731
12600	A (Dwg 0500-04-S)	CMC 67033
12608	SP-7 (Dwg 0903)	CMC 68393 CMC 1969 DCA 19973

*Support number and location shown on B&R drawing number FSE-00185

During the field inspection, the reviewer verified the following were in accordance with requirements specified or design drawings: method of attachment to wall and/or ceiling, dimensions, elevation of support, proper size of structural steel members, joint connection details, and configuration of support.

The reviewer also walked down other areas in the auxiliary and electrical control building and examined cable tray supports for general configuration and quality of workmanship. During examination of supports in the Unit 1 cable spreading room, the reviewer noted that six and eight inch siderails had been added to four inch deep trays. The practice of increasing the height of siderails on cable trays and its effect on the design of cable tray supports was examined by the reviewer. Details of this review are discussed in paragraph G.b.(7).c below.

(c) Review of Quality Records

The reviewer examined quality records documenting construction and QC inspection of the cable tray supports listed in the paragraph above. These records included construction travelers, weld filler material logs, and cable tray inspection reports for installation of cable tray hangers, cable tray clamps, and installation of expansion anchors or Richmond Inserts. Based on review of the records, and the walkdown inspection discussed above, the reviewer concluded that the cable tray supports were constructed and inspected in accordance with the requirements of the construction drawings. The records were neat, legible, complete, and retrievable.

(5) Inspection and Testing of Richmond Inserts

(a) Review of Program for Verification of Installation of Richmond Insert Bolts

During review of records, the licensee determined that documentation of QC inspections were incomplete for installations of Richmond Insert bolts. In order to verify that bolts of the proper length were installed in the Richmond Insert sleeves, the licensee carried out a reinspection program for the Richmond Insert bolts. The reviewer examined TUGCO procedure number QI-QP-11.14-8, Verification of Installation of Richmond Insert Bolts, which was used to control the reinspection program. During the reinspection program, QC inspectors verified the length of the bolts either through ultrasonic testing or physical measurement, and checked bolt diameter, minimum embedment length, and "snug tight" condition of the bolts. The reviewer discussed the reinspection program with mechanical QC inspectors responsible for its implementation in the electrical control building. Based on review of the procedures and discussions with the QC personnel, the reviewer concluded that the reinspection program to verify installation of the Richmond Insert bolts was comprehensive.

(b) Observation of Testing of Richmond Inserts

The licensee is performing extensive onsite testing of the Richmond Inserts to confirm the strength values used in design of structures using this type of anchorage. The reviewer examined TUGCO Engineering Instruction number CP-EI-13.0-13 which specifies the method of installation of test specimens, and describes the test apparatus and specifies the technique used in application of the test loads. The reviewer examined the testing apparatus and verified that the test equipment had current calibration stickers. The reviewer observed the tension test of specimen 28, a 1 inch EC-2W Richmond Insert, and the shear-tension test of specimen 6, a 1½ inch EC-6W Richmond Insert. During the tests, the reviewer verified that application of the test load was accomplished in accordance with the procedure requirements and that the test data was accurately recorded. Following completion of the above tests, the reviewer examined the results of tension and shear-tension tests that had been previously completed and noted that those results were consistent with the results of the tests witnessed by the reviewer. The majority of the modes of failure resulted in failure of the high strength bolts, not the concrete or insert sleeve. The reviewer also examined the concrete cylinder unconfined compressive test data to verify the strength of the concrete was recorded for use in evaluation of the test results.

(6) Program for Application of Protective Coatings in the Unit 1 Containment Building

(a) Review of Specification and Quality Control Inspection Procedures

The reviewer examined specifications and quality control procedures for application and inspection of Service Level I protective coatings, for steel structures, including the polar crane and liner plate, inside the Unit 1 reactor building. Acceptance criteria utilized by the reviewer appear in ANSI Standard N101.2-1972 and FSAR Section 3.8.1.6.5.g. Procedures examined were as follows:

- G&H Specification 2323-AS-31, Protective Coating,
- TUGCO procedure number CP-QP-11.4, Inspection of Protective Coatings
- TUGCO Procedure number QI-QP-11.4-1, 11.4-5, 11.4-17, 11.4-22, 11.4-26, and 11.4-28. These procedures cover inspection of storage and handling of protective coating materials, surface preparation, application of the primer and finish coats, and when necessary, coating repairs.
- TUGCO Procedure Number QI-QP-11.4-23 and 11.4-29. These procedures cover reinspection and testing of coated steel for which inspection documentation was incomplete.

(b) Observation of Protective Coatings work Activities

The reviewer witnessed application and inspection of protective coatings on steel structure inside the Unit 1 reactor building. During this onsite review the bulk of the protective coating application work in progress consisted of repairs to the primer and finish coats, and surface preparation for application of coatings. The reviewer verified environmental conditions were being monitored and were acceptable in the reactor building at time of application of coating. The reviewer observed that application of the coatings and QC inspection of the coatings were being performed in accordance with NRC and procedure requirements.

(7) Onsite Civil Design Activities

(a) General

Onsite civil design activities are performed by Gibbs and Hill (G&H) civil-structural engineers who work under the direction of the G&H lead civil-structural engineer who reports to the TUGCO Nuclear Engineering Manager. The onsite G&H engineers have access to the FSAR, codes, standards and design criteria, and copies of the original design calculations. The bulk of the design work presently being performed onsite relate to review and approval of design changes (CMCs and DCAs). Many of the design changes are originated at the request of construction personnel and involve minor changes, usually due to construction interferences.

(b) Review of the Design Change Program

The reviewer examined G&H Project Guide-29, Site Review of CMCs, DCAs and S-0910s. This procedure establishes the guidelines under which onsite design change reviews are performed. Acceptance criteria examined by the reviewer were ANSI N45.2.11 and NRC requirements (Criteria III to Appendix B, 10 CFR 50).

The reviewer discussed the design change program with license engineers. These discussions disclosed that when a request for design change is made by construction craft or QC personnel, the design change is prepared by civil project engineer. During preparation for the design change request, the civil project engineer usually performs some preliminary calculations in order to arrive at a feasible and workable solution to the problem. After the design change request is prepared, it is transmitted to the G&H onsite design engineers and to construction. Construction personnel implement the design change "at risk." That is, if the G&H design engineers do not approve the design change, a removal notice is issued and the work affected by the design charge is eitner removed or reworked in order to comply with the approved design change request. Discussions with licensee engineers disclosed that approximately 99 percent of the design changes are approved by the G&H design engineer without revisions and therefore, do not require rework after they are implemented by construction. After receiving the design change request, G&H civil engineers perform a detailed review. Approval of the design changes consists of a detailed review by an engineer, followed by an independent review by another engineer serving as a checker. If the design change does not meet the requirements of the design criteria, it is revised as necessary. After it is reviewed and approved, the design change is distributed per procedural requirements.

The reviewer examined randomly selected design changes which had been made to drawing number 2323-E1-0713-01-S, Cable Tray Support Plan. These included two which were currently being reviewed by the G&H design engineers, (CMC 8229, R12 and CMC 8235, R3), several which had recently been reviewed and approved by the G&H design engineers, and several others which had been reviewed by G&H engineer since 1979, the last date drawing 0713-01-S had been revised.

Based on this limited review of the design change control program implemented at the site, the reviewer concluded that design changes are being properly reviewed and that design changes are being accomplished in accordance with NRC requirements.

(c) Review of Cable Tray Loading

As discussed in paragraph G.b.(4) above, the reviewer noted during field walkdown inspections that siderails had been raised on some cable trays in order to accommodate additional electrical cables. The reviewer also noted that fire barrier materials, commonly known as thermolag, were being added to the cable trays (electrical raceways). The reviewer examined the design controls used to verify the structural adequacy of the cable trays from the increase in loadings due to the addition of thermolag and/or addition of cables to the trays. Details of the review are discussed below.

- Evaluation of Effect of Thermolag Fire Barriers on Structural Adequacy of Cable Trays/Supports

The reviewer examined TUGCO engineering procedure CP-EI-4.0-49, Evaluation of Thermolag (TSI) Fire Barrier Material on Class 1E Electrical Raceways. This procedure outlines the program to be implemented to verify that cable trays and supports meet seismic design criteria after installation of the thermolag is completed. The program will verify that the combination of the weight of the cables in the trays, the dead weight of the trays, and the weight of the thermolag will not exceed the maximum design allowable load of 35 psf. The procedure outlines steps to be followed when the allowable design load is exceeded. The reviewer discussed this program with licensee engineers who stated that the "as-building" of the cable trays to account for the installation of the thermolag will begin in the near future. After the as-building program is completed, the evaluation of the effect of additional weight of the thermolag on the cable trays will be performed per procedure CP-EI-4.0-49 requirements. This area is being referred to the Comanche Peak Project Director for followup.

- Evaluation of Increases to Height of Cable Tray Side Rails

  During the field walkdown discussed above, the reviewer randomly selected for review three four-inch cable trays in the Unit 1 cable spreading room which had 6 or 8 inch side rails. These were tray numbers T-13-OCC-Q07, T-13-GCC-M10, and T-13-GCC-M33. The above trays are 30 inches wide. The reviewer examined sheets 1 and 12 of drawing number 2323-E1-0712, and the 133 DCAs against sheet 1 and 4 DCAs against sheet 12. These drawings detail the layout and size/type of the above cable trays. The reviewer also examined the document packages maintained in DCC Satellite 307 for the above drawings and verified that they were complete and contained the latest (current) revisions of the design changes. From review of the design change documents, the reviewer verified that addition of the 6 or 8 inch side rails to the 4 inch deep trays was authorized by DCAs. For example, the addition of 8 inch side rails to cable tray 13-OCC-Q07 was authorized by DCA 15207.

The reviewer discussed the effect that raising the side rails of cable trays has on the tray and support design load of 35 psf with project civil and electrical engineers. These discussions disclosed that the side rail depths were increased because cable extended above the side rails of the 4" deep trays. This often occurs at intersections (TEEs) of trays and is a result of cable pulling problems. The engineers stated that whenever the height of siderails is increased, the total loading of the trays is checked to verify it is below the design allowable of 35 psf. The cable load for each tray is documented in the G&H Cable Raceway Schedule, 2323-E-1-1700. Various other schedules maintain the identity of each cable in each tray and the weight of each cable. The raceway schedule expresses capacity of the trays as percent filled. Review of the schedules disclosed the data shown in the Table below:

TABLE

Tray Number	Number of Cables	Percent Filled
T-13-OCC-Q07	198	28
T-13-GCC-M10	288	31
T-13-GCC-M33	217	28

From review of the cable schedule, the reviewer determined that the average weight of the cables in tray T-13-OCC-Q07 was approximately 0.11 pounds per linear foot. Therefore the cable load in this tray is

$$\frac{\text{(number of cables)(w +/ cable)}}{\text{Width of tray}} = \frac{\text{(198)(.11) pound/ft}}{\text{2.5 Ft}} = \text{8.8 PSF}$$

This is well below the design allowable load value.

Based on review of the above schedules and discussions with responsible engineers, the reviewer concluded that the design values used to determine the structural adequacy of cable tray supports are conservative.

(8) Personnel Interviews

The reviewer conducted informal interviews with nine civil and six mechanical QC inspectors. Subjects covered during the interviews were the inspector training program, ability to discuss their safety concerns with their management and/or the NRC, cooperation between craft and QC personnel, and availability of technical assistance from engineering personnel. From the interviews, the reviewer concluded that the QC inspectors felt freedom to express their safety concerns to management and/or the NRC, that the inspectors felt that craft personnel were aware of the requirements to do the work properly, and that the craft recognized the importance of QC inspection activities and cooperated with the inspectors. The inspectors stated that engineering assistance in resolution of problems was available whenever they requested it. The interviews also disclosed that the licensee has an extensive training program which the inspectors are required to complete prior to becoming certified and being able to inspect and accept work. The training program involves classroom training, on the job training, and passing written and practical exams (the exams contain essay type questions, not multiple choice). The training program for the inspectors performing inspection of structural steel protective coating involved 40 hours of classroom training and 80 hours of on the job training. The inspectors did state that the large number of unicorporated design changes against some drawings made their jobs more difficult at times, but most said that after working in an area for a period of time they became familiar with the changes and were able to overcome this problem.

c. Conclusions

(1) The licensee has effectively implemented the QA program requirements in the areas examined by the reviewer.

(2) QC inspectors are knowledgeable of their inspection requirements and perform their inspection in accordance with the licensee's QC procedures.

(3) The licensee's QC inspector training program is comprehensive.

(4) The licensee's present document control system is good. Though the number of unincorporated design changes against some drawings is large, the availability of a package containing a complete set of the documents made review of the documents possible without too much diffculty to an experienced inspector. The licensee's new unique DCC system (use of computers) exceeds NRC requirements in the area.

(5) The quality records examined by the reviewer were neat, legible, retrievable, and complete.

(6) One negative point noted by the reviewer is the larger number of unincorporated design changes against some drawings. This results in a cumbersome package to be reviewed when performing work or inspections. This item allows opportunity for errors and requires additional time to be consumed for work to prevent these errors. The reviewer did not identify any hardware problems resulting from the licensee's system, except for the item identified in paragraph G.b.(2) above.

(7) The design change process is controlled and complies with NRC requirements. The "at-risk" design change process described in paragraph G.b.(7) above is not unique since it has been used on other nuclear construction projects. The design change program is laid out, but could allow for implementation problems if not meticulously followed.

H. Review of Heating Ventilation and Air Conditioning Systems (HVAC)

References: Drawings, standards, and specifications applicable to this equipment are as follows:

Hanger Dwg. SG-790-2J-1R, Rev. 0
Hanger Dwg. SG-790-2J-1V, Rev. 0
Hanger Dwg. SG-790-2J-R1B, Rev. 0
Hanger Dwg. SG-790-1J-P1L, Rev. 1
Hanger Dwg. SG-790-1J-10C, Rev. 0
Hanger Dwg. SG-790-1H-R1G, Rev. 0
Hanger Dwg. RB-832-1E-1A, Rev. 0
Hanger Dwg. RB-832-1E-1L, Rev. 0
Dwg. 2323-M2-0651-HAN, Rev. 2
Dwg. 2323-M2-0651-HBSC, Rev. 1
Dwg. 2323-M1-0651-HAN, Rev. 6
Dwg. 2323-M1-0651-BSC, Rev. 6
Dwg. 2323-M1-0551-BSC, Rev. 10
Dwg. 2323-M1-0551-HAN, Rev. 9
Dwg. 2323-M1-0554-BSC, Rev. 12
Dwg. 2323-M1-0554-HAN, Rev. 7
Dwg. FCUS-0010-HAN, Rev. 5
Dwg. 2323-S1-0600, Rev. 17
Dwg. MC-134-680C
Dwg. MC-143-689C
Dwg. DCA 3262, Rev. 1
Dwg. ANS D1.1
Specification 2323-MS-85, Rev. 3
Procedure WP-TUSI-001, Rev. 0
Procedure DFP-TUSI-003, Rev. 8

a. General

The reviewer conducted tours of containment, auxiliary building, safeguards building, and control building for both units to generally observe quality, work in progress, material control, and protection of HVAC equipment, as well as weld rod control. Discussions were held with craft and inspection personnel during these tours relative to plant quality.

b. Review Effort

Previous discrepancies identified by NRC regarding HVAC installation served as a driving force for this review effort. A review was made of evaluations and calculations performed as a result of the previously identified problems. In addition, the reviewer observed HVAC ducting and supports for conformance to applicable drawings, specifications, and standards.

The reviewer generally observed ducting in various areas of the containments, auxiliary building, safeguards buildings, and control building for both units for proper bolting, proper gaskets, and structural integrity. In addition, the inspector observed duct and equipment supports for conformance to requirements. Supports reviewed included unit 2 duct hangers 2J-1R, 2J-1V, and 2J-R1B; Unit 1 duct hangers 1J-R1L, 1J-10C, 1E-1A, 1E-1L, and 1H-R1G; floor mount of Unit 1 Train A Containment Spray Pump Room fan coil unit; and the two unit 1 Safety Injection Pump Room Fan Coil unit hangers.

c. Conclusion

No significant problems were identified relative to ducting. Only minor problems, well within previous discrepancies evaluated, were found in duct supports. Dimensional variations were noted in the hangers for Safety Injection Pump Room Coolers. These deviations were analysed during the review indicating that these hangers were acceptable. Several minor drawing errors were also noted which were corrected during the review. The evaluations and corrective actions performed as a result of previously identified problems with HVAC installation appear to be adequate.

I. Formal Interviews of QA/QC Personnel

a. Formal interviews were conducted of QA/QC personnel in order to assist in assessing site quality and management support of site quality. It was felt that discussions with inspection personnel would give a good conservative insight into whether or not the plant was being constructed properly. Interviews of five management personnel and twenty-eight inspectors were conducted. Inspectors were selected at random with one exception. Electrical inspectors were primarily selected from a group of inspectors which had recently been involved in a personnel incident involving a dress code "(Tee Shirt)" issue in order to assess whether these persons had significant technical concerns. In addition, two electrical inspectors indicated a desire to talk to NRC and were interviewed. Several additional electrical inspectors were chosen in addition to inspectors in various other disciplines.

The group included inspectors working for eight different supervisors. Experience of these personnel ranged from persons who had been in QC less than a year, to persons who had been at Comanche Peak from early construction (mid 1970s). Most had some previous experience such as site craft, non-nuclear industry or military experience. Some had worked at other nuclear facilities.

The major thrust of the interviews was to determine if the personnel had any plant safety or quality concerns. Concerns in these areas were solicited from all those interviewed. Discussions of other subjects were also held with most of the individuals interviewed. These subjects included intimidation, support for identifying problems, ability to have problems evaluated and corrected as necessary, feedback on evaluation of problems, adequacy of training program, and relationship with NRC.

All but two inspectors stated they felt the plant would be safe which meant they had no significant quality problems which they felt would compromise safe operation. One inspector, who was not sure of the plant's safety, stated he was assigned to an area which was less controlled than he was used to, e.g., non-ASME code work versus ASME code work (which has the most stringent requirements), and was uncomfortable with the leeway allowed in this area. This person also indicated he had doubts about QA at nuclear plants in general. The other individual who was unsure of plant safety indicate he was satisfied with quality with one exception. This involved a specific problem which he was not sure was adequately evaluated. This item was described to the NRC:RIV Senior Resident Inspector for followup. Two inspectors who stated they had decided on their own that they wanted to talk to NRC, expressed very strongly that the plant quality was "excellent" and there was no plant safety concern. Another inspector, with over twenty-years' experience, who was at his fifth nuclear plant said Comanche Peak was the "best" plant he had seen.

Seven inspectors expressed one or more specific concerns. These concerns involved questions on whether a particular procedure requirement or whether a particular technical evaluation was appropriate, documentation problems not involving quality of construction, questions whether certain personnel transfers were discriminatory, inaccuracies in some written Nonconformance Report (NCR) evaluations, and concerns which had recently been brought up and were yet to be evaluated by the licensee. All concerns have been forwarded to the Comanche Peak Project Director for followup for review and evaluation as necessary. Several concerns were given to NRC:RIV personnel during this inspection and followup showed that there was no technical problem identified.

The NRC Resident Inspector was familiar with one of the concerns and had already evaluated the condition as technically acceptable. Several additional concerns were given to RIV personnel verbally on the last day of this inspection for timely followup.

The special team interviewer reviewed the concern regarding transfers of six of seven individuals mentioned in the personnel transfer concerns. These transfers appeared to be non-discriminatory. It should be noted that in all cases of concerns involving specific hardware discrepancies these discrepancies had been identified to appropriate licensee personnel and had been or were being evaluated.

All inspectors questioned (21) as to their ability to identify problems such as via NCRs, indicated no suppression in this area. Several inspectors indicated that NCR written evaluations could be more clear and complete in some cases.

Feedback regarding problems, such as via explanations of NCR evaluations, was considered good by 19 of the individuals questioned. One individual indicated he did not always receive complete feedback but these items did not involve significant technical concerns. Two individuals stated they felt uncomfortable with some "use-as-is" NCR evaluations. One stated that more feedback was needed as to reasons for procedure changes.

Many of the inspectors indicated that communications were improving and the assignment of the new site QA manager was a positive step in improving communications. It was clear that some communications problems had existed in the past and rapport between inspectors and their management had been strained previously in some areas. Communications in the ASME code construction area appeared to be exceptionally positive.

All but a few inspectors were questioned regarding intimidation by craft. No significant problems were identified although two individuals mentioned two incidents when the craft were upset with inspectors when problems were found. No threats were made during these incidents. Generally, the rapport between craft and inspection appeared to be very good.

Adequacy of the training program was discussed with approximately half of the inspectors. Several indicated that the formal training could be better, i.e., tougher (not necessarily more extensive) but formal training, plus on-the-job training was adequate to perform the inspection functions. Many stated that the training was excellent.

Twenty inspectors felt no hindrance at all to talking with NRC and indicated that the freedom to talk with NRC has been continually stressed by management. Several indicated some apprehension about talking with NRC which appeared to be a natural fear of the position

NRC holds. Several were under the impression for a short while that they must have their "act together" if they were going to see the NRC, but now appear to feel no hindrance. Most indicated they saw NRC inspectors regularly in the field but a majority indicated that they had not talked directly with NRC in the field.

Interviews of management indicated they were very supportive of inspectors and sensitive to inspector concerns. There appeared to be a strong encouragement for personnel to come forward with any concerns, as evidenced by a memorandum dated March 22, 1984, to all QA/QC personnel from the Site QA Manager. Postings indicating management support for inspectors and other personnel in identifying problems were prominently displayed along with NRC Form 3, NRC Information Notice 84-07 and 10 CFR 21 information.

In summary, although some concerns were expressed requiring further review, these concerns did not appear to be excessive in number or serious and would be normally expected during the interview process. Generally, the most experienced inspectors had a high confidence in the quality of the plant. Past problems in communication and some past apprehension about management support had existed but there seems to have been a marked improvement in this area. No one indicated that past communication problems had caused them to not perform inspections properly or not to identify problems when found. Inspector freedom to identify problems and freedom to talk with NRC has apparently been strongly stressed. Management appeared to be sensitive to employee concerns and appeared to be seriously evaluating existing concerns.

b. In addition to formal interviews, numerous informal discussions were held between the NRC team personnel and site managers, craft, inspectors, engineers, and office personnel as indicated previously in other sections of this report. The comments received from these individuals were consistent with those received during the formal interviews. These discussions covered topics such as plant quality, training, management support, and document control.

Appendix A, which follows, is a sanitized listing of concerns raised by individuals during the interview process. The concerns are only those which will require followup by the Comanche Peak Project Director. The interviews were sanitized only so far as confidentiality is related.

APPENDIX A

Inspector Name: A-1

Date Interviewed:

General Background:

Interviewee Comments:

- Uncomfortable with less structured program for non-ASME versus ASME; e.g., seem to change dwg. when structure doesn't meet original, can add welds in field and he doesn't think it gets incorporated into dwg., QC lead can approve changes to travelers for non-ASME structures, not much QA involvement in this area.

- Specific: Procedure QIQP 1114-12, electrical mounting backfit, craft complained so procedure was revised to reduce number of inspections, 4 revisions made to delete requirements (bolt tightening, etc.)

- Has the impression that QA has been generally deficient at nuclear plants and QC has not been supported at Comanche Peak in the past.

- Indicated main problem is probably him being able to adjust to non-ASME work: is not aware of code violations taking place.

Inspector Name: A-2

Date Interviewed:

General Background:

Interviewee Comments:

- Has some concern with use-as-is NCR situations, use-as-is seems particularly prevalent when using Specification ES-100.

- Specific Technical Concern: NCR was written when cable damage occurred during Biso Seal removal using a threaded rod. This occurred in Auxiliary Building, elev. 832'. NCR said no damage was done to cable but some insulation had been scraped off by rod. Feel further evaluation may be in order for these cables and there may be similar problems elsewhere.

- Specific: Wrote 2 NCR's regarding traceability of fuse blocks. Blocks were not marked "Q". NCR said OK as-is because no non-Q blocks were purchased via order MS-605. Feels other similar non-Q blocks have been purchased via different purchase order and could have been installed as Q. Thinks this a possible paperwork problem.

- Specific: Wrote recent NCR (not yet evaluated) on GE Motor Control Centers. Compression lugs have bends as much as 180 degrees (more than normally done done by site construction). Don't think GE can violate requirements and may be a problem elsewhere in GE MCC's. Also have some broken wire strands which we are fixing as we find.

- Specific: Had previous paperwork conflict problem in solving rework of terminal blocks. 6 page RFIC involved and Proc. SAP-6 involved. Wrote 2 NCR's. NRC inspectors Creek and Johnson were aware, Creek told NRC inspector Taylor, Taylor told ________ to have an answer. Never got feedback as to results.

- Specific: Repaired a solenoid, shortly after coming to Comanche Peak in craft, without paperwork. Don't know if it was safety related. Not concerned with solenoid technically - did a good job.

Notes: The specific concerns were given verbally to the SRI - Construction on 4/12/84 for further followup. It was indicated during the interview he would get more specifics for SRI. MCC problem was still being evaluated. I suggest allowing the licensee to evaluate and then followup for adequacy of corrective action.

Inspector Name: A-3

Date Interviewed:

General Background:

Interviewee Comments:

- Generally concerned with finding numerous problems during past construction inspection and procedure being changed to delete inspection, e.g., loose terminations found in lighting.

- Some NCR's are answered simply that the problem is not addressed in Specification ES-100.

- Recent NCR written because restraint cable (lighting) crimp gages were worn & therefore, inspection was inadequate. This is still being evaluated.

- Wires of two different gages were terminated at some lugs and many terminations are loose.

- Have more pressure not to write NCR's during turnover.

- Found loose LB's (elbow termination fittings) @ East & South ends of Unit 1 Diesel Generators, wrote two NCR's, was accepted as is.

- Found cables not trained (routed) in workmanlike manner in Unit 1 Cable Spread Room @ junction boxes 1058 and 1059. NCR said OK because cable radius was OK but did not admit workmanship problem.

- Feels post construction inspectors were transferred to Unit 2 as retaliation for finding problems.

- Heard second hand that IR's (inspection reports) were being written falsely (without reinspection) to clear IIRN's (discrepancy report) on cable trays. Heard from lady in Paper Flow Group (PFG) and lady in vault. Said he would get back to NRC with more specifics.

Notes: Some review of the lighting termination issue and post check procedure was conducted by team member Ruff. The site inspector indicated he had told _______ of most of these issues and QA was evaluating. I forwarded concern relative to 1058 & 1059 junction boxes to RIV: Martin and he indicated he inspected these boxes and sees no technical problem. Resident Inspector: Smith participated in most of the interview and indicated he was aware of the D/G loose fittings and sees no technical problem. I evaluated reasons why 6 personnel including _________ were transferred to Unit 2 and this move does not appear to be discriminatory.

Inspector Name: A-4

Date Interviewed:

General Background:

Interviewee Comments:

- Uncomfortable with some use-as-is situations, e.g., cable separation problem found in fuel building during walkdown did not meet procedure but was evaluated as use-as-is. He can show someone where it is.

- Wrote NCR on lack of 5-thread engagement on a conduit fitting - poor evaluation in that they simply said that couldn't see it; a second NCR was written on this area for cable damage, seemed to be looking for a way to buy this area off, took two tries to get everything evaluated. ______ knows about this but didn't get back to him on fact that NCR's were poorly handled, i.e., non-technical aspects.

- Feels discriminated against in that he was transferred to Unit 2 where there is no overtime. Got grilled on cable damage NCR at the same time as being counseled on a personnel issue so it appeared that his transfer had something to do with NCR. Management [illegible] aware of this concern.

Note: I did not review this person's transfer situation.

Inspector Name: A-5

Date Interviewed:

General Background:

Interviewee Comments:

- Had problems with post check, e.g., loose lighting terminations and junction boxes. Took lighting out of procedure and made it more difficult to look at junction boxes. Management was made aware of these concerns. (Has no significant safety concern)

- More tendency toward use-as-is when pressure is on (safety requirements are being met, however)

- Has had some fear of talking with NRC, didn't think reporting on-site would ever get off-site, doesn't have NRC RIV phone number

- Feels discriminated against by being transferred to Unit 2

- Some NCR evaluations are inaccurate or unclear, e.g., statement that workmanship was not compromised when in fact workmanship was poor but the item was technically acceptable

Notes: I reviewed the transfer situation; appears to be reasonable but not as clear as reasoning on other 5 transfers. NRC Form 3 appears well posted so I'm not sure why he doesn't have the number. He does not appear to fear talking with NRC now. Although, he stated he does not have significant safety/quality concerns, his comment on NCR answers is interesting. Similar general comments were received from other inspectors and this could indicate a need for better answers on NCR's. An example would be that if a workmanship question was not addressed properly then perhaps needed retraining of personnel as preventive action would not get performed. Perhaps the licensee needs to improve in this area.

Inspector Name: A-6

Date Interviewed:

General Background:

Interviewee Comments:

- Added higher sides to some cable trays to keep cables in trays
- Also there may be cable density/compaction problem in this area
- It's tough to keep people off trays to keep from damaging them
- Have had problems with clearance of pipe and cables, have to notch insulation, place metal between insulation and trays
- There is alot of rework to get proper separation

Notes: This man was questioned primarily to get input for RIV review of cable spread room as to where there could be problems. He personally has little problem with plant quality. RIV - Martin was at the interview and verbal feedback on the first two items indicated that the situations were acceptable.

Inspector Name: A-7

Date Interviewed:

General Background:

Interviewee Comments:

- Had problems with Paper Flow Group (PFG), when first implemented, with completeness of packages. Getting better and does not know of safety problem involved

- Some inaccurate NCR answers

- Site has problem with lost records, 2 people are assigned full time in the vault, NCR's are not written on lost records, reinspect when record is lost but this reinspection may be very difficult or very impractical. He has no evidence that reinspections are not getting done. This problem could relate to competance of PFG people, i.e., maybe they lost records.

Note: Various special team members looked quite extensively at records. Results are in the team report.